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Yours Truly

R. S. Stanton M.D.

PRINCIPLES

AND

PRACTICE OF SURGERY.

BY

JAMES SYME, F. R. S. E.,

PROFESSOR OF CLINICAL SURGERY UNIVERSITY OF EDINBURGH, SURGEON TO THE QUEEN, ETC.

EDITED WITH

NOTES AND ILLUSTRATIONS.

BY

ROBERT S. NEWTON, M. D.,

PROFESSOR OF SURGERY IN THE ECLECTIC MEDICAL INSTITUTE OF CINCINNATI, OHIO; CLINICAL LECTURER ON SURGERY IN NEWTON'S CLINICAL INSTITUTE; LATE PROFESSOR OF SURGERY IN THE MEMPHIS INSTITUTE; PROFESSOR OF THEORY AND PRACTICE IN THE ECLECTIC MEDICAL COLLEGE OF CINCINNATI, ETC., ETC.

FROM THE LAST EDINBURGH EDITION.

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TO THE

ECLECTIC MEDICAL PROFESSION

IN AMERICA,

THIS FEEBLE ATTEMPT TO IMPROVE

THE SCIENCE AND THE ART OF SURGERY

IS RESPECTFULLY DEDICATED BY

THE AUTHOR.

PREFACE.

In preparing the surgical writings of Mr. Syme, I have been actuated by no other motives than to present the American profession with the best surgical information extant in Europe, and the numerous improvements and modifications which have been introduced at a recent date by American Eclectics. I need hardly say that the great distinctive feature of Eclecticism, whether in Medicine or Surgery, is the attainment of the greatest success; to admit and practice the truths which are found scattered here and there throughout the writings of all classes of medical men. If Mr. Syme is the best known operator, it is our duty to operate in the same way; if his principles are correct, it it is our duty to adopt those principles; if any surgeon has improved on his operations, we must recognize those improvements; if his surgical remedies are not the best, then it is our duty to point out the best, and we should always be ready to furnish a reason for deviating from established maxims and rules. It is evident that it is only by cultivating such a spirit as this that Surgery and Medicine can be brought up to the high standard of a positive science. Mr. Syme, like other men, is not infallible; he has committed errors—and who has not? If we should reject the opinions of every man who entertained some erroneous views, there would not be one authority left.

The question is often asked, What have American Eclectics done to advance Medicine and Surgery? Our works on Practice, and the results of our teachings as manifested by the success of American Eclectics, show most conclusively that we have vastly improved our Materia Medica; introducing agents on the certain action of which the Physician and Surgeon can rely—agents which the general profession are adopting throughout the country. We have shown the true character of mercury, arsenic, and similar agents as internal remedies, and produced compounds which do all that mercury is claimed to do, and even more, for they are free from the objections to which mercury is liable. We have demonstrated that inflammation is not a disease; that bleeding is never necessary, and that the practice is always unsafe. We have furnished a more rational system of practice, because we reject all theories which do not bear the tests of experience. In a word, we seek for the positive and truthful no matter where found, and adopt as fact only that which we can demonstrate in practice. In the department of Surgery, we have made great improvements, as will be seen by the readers of this work. We have simplified operations, and made diseases curable which have heretofore been considered as incurable.

The work of Mr. Syme presents the Science of Surgery as known to the Allopathic profession; my notes are intended to prune it of its errors and make it an Eclectic work. If my readers will think for themselves, and allow no man to think for them,

I do not fear but that this work will be productive of great good. Mr. Syme entertains very correct notions of what is necessary to make a good Surgeon, as will be seen by the following introductory lecture by him on the subject:

"It is obvious that your first object should be, a thorough acquaintance with the anatomy of the human body; since the duty which you have in view being to correct the derangements of a complicated machine, you must of course know the structure and uses of its various parts. Here, however, I beg to warn you against paying undue attention to the system of minute investigation at present so much in fashion. I am no enemy to the microscope, and on the contrary, believe that much useful as well as curious information may be obtained through its assistance, but I beg to inform you that the utmost amount of knowledge derived from this source can never supply the want of acquaintance with the form, structure, and relations of parts, which are obvious to the unaided senses of sight and touch. It would, indeed, be no less impossible to ascertain the geographical features of a country by counting the particles of sand on the sea beach, than to learn the anatomy which a surgeon requires by microscopical examination of the texture concerned. You should endeavor at first to learn the bones, and ligaments, muscles, and viscera, which constitute the bulk of the body, after which the distribution of the vessels and nerves will be easily mastered; and then you may proceed to the study of minute structure. In regard to physiology, again, all that can be learned satisfactorily and surely should be acquired before turning your attention to what is obscure and doubtful. Your next step will be to learn the various derangements to which the human body is liable, whether from the effect of violence or diseased action. Instead of trusting to books or lectures, with their drawings and descriptions, for this information, you should take every opportunity of studying recent specimens of morbid structure.

"You will next have to attain the power of recognizing and discriminating during life, the various alterations of structure and morbid actions to which the body is liable. When your watch is out of order, you take it to the maker, who opens it, examines the interior through a magnifying glass, and then states in precise terms what is wrong. But if a man complains of pain, you cannot lay open a joint to ascertain its cause, or cut into his abdomen to examine any of the viscera which may be suspected to be in fault. It is the symptoms or changes resulting from disease, which constitute the characters requisite for their discrimination, and the more familiar they become to you, the more readily will they be recognized.

"Having advanced thus far, you will next have to acquire the knowledge which is to guide your treatment; in other words, the principles of practice: and here a great difficulty presents itself. If, in the treatment of every derangement to which the human frame is subject, all surgeons were agreed as to the proper remedy, this part of your professional education would be sufficiently easy; but such, unfortunately, is not the case; and in respect to most derangements, diversity of opinion, as well as practice, has existed, still exits, and probably will ever continue to do so. For instance, hydrocele may be remedied by cutting out a portion of the sac, or, as it is called, the operation of excision; by caustic, seton, and injection with port wine, tincture of iodine, iodide of potassium, or cold water; while a former colleague of mine preferred blowing up the bag with air. Then in the treatment of incised wounds, the method at no distant period universally pursued was to stuff the cavity with tow, flour, and eggs, or other similar matters so

as to prevent the possibility of primary union ; while another plan was to plaster up the orifice, so as effectually to prevent the escape of blood or other discharge from it, and thus insure the cavity being converted into an abscess ; and a third method was to delay dressing the wound for six or eight hours, until all oozing had ceased ; a fourth method being to keep the edges wet ; and a fifth, to apply some permeable substance, as a sponge over the wound, so as to press the sides together and absorb any discharge which, if retained, might tend to separate them.

"When lately spending a few days in Paris, I was requested to operate upon a gentleman resident there, who required a tumor to be removed, and had determined to come here and place himself under my care for the purpose, but who, happening to learn that I was there, urgently entreated me to perform the operation. I did so, inserted the necessary stitches, and placed over the wound a large sponge, which was removed at the end of forty-eight hours, when union by the first intention had taken place completely, and literally without a drop of matter being formed. This case was peculiarly interesting to me, since, when I resided at Paris as a student, thirty years ago, the invariable practice was to stuff the cavities of wounds, their primary union being regarded as an impossibility, and I should have been very happy if some of my old associates at the Hotel Dieu could have compared the effect of placing a sponge on the outside, instead of the inside of a wound.

"Amid such a confusion of conflicting opinions and procedures, how are you to select your principles of practice? Are you to try in succession all the projects that have ever been suggested, and from your own experience determine which should be preferred? Such a course is obviously no less impracticable than inexpedient, and it is plain that you ought to be guided in your choice by some authority deserving confidence. You may hence perceive the heavy responsibility which is incurred by a teacher of surgery, or the author of a practical surgical work, and perhaps appreciate the recklessness with which principles are too often laid down without any good foundation, as well as the incautiousness with which they are apt to be adopted without any investigation.

"Not long ago, in an American journal, I saw an advice to students for the choice of a surgical book, always to prefer the one most recently published, from which it would appear that novelty, instead of experience, was held to stamp the value of principles—a most dangerous doctrine, as it seems to me, when we take into consideration the baneful influence that may be exercised over a whole professional life, by the adoption of a single erroneous view in regard to the treatment of disease. Let me, therefore, beg that you will never adopt as your own the opinions of others, merely because they appear in print, or are promulgated from a professor's chair. Regard prejudices as your worst enemies, and believe nothing that has not a foundation in reason.

"You may now expect that I should next insist upon the importance of manual dexterity, and will probably be surprised when I tell you that it has no real existence in surgery, so far as the overcoming of mechanical difficulties is concerned. The carpenter who constructs a piece of furniture from the rough plank, or the blacksmith who forges a horseshoe from a bar of iron, requires dexterity, but not so the surgeon, whose manipulations are of the easiest and simplest kind, since it is not the doing, but knowing what is to be done, that constitutes the difficulty of practice. The manual duty of the sur-

geon may be compared to that required for steering a vessel, where there is little difficulty in turning the wheel, while the direction in which it is turned determines the fate of the ship and all on board. In the same way an operator makes his incisions with no less facility than if he were cutting a slice of bread or cheese, but by their extent and direction determines the fate of his patient. The result of an operation, in so far as its execution is concerned, depends upon knowing what to do, when to do it, and how to do it.

"Thus, in amputating at the ankle, where a flap is formed of the thick integuments of the heel for covering the ends of the bones, it may seem a matter of indifference whether the dissection be conducted from below upward, or from above downward, but it is not so to the patient, since in the former case he quickly recovers with a comfortable stump, and in the latter, if he lives long enough, will, in all probability, require a secondary amputation, on account of the flap having sloughed from want of nourishment. Another illustration may be taken from the operation which I have introduced for the treatment of stricture in its most obstinate form, by external incision upon a grooved director, which, when properly performed, may be regarded as perfectly safe and permanently effectual, but, in order to prove thus satisfactory, must be executed with strict attention to the principles upon which it is founded. I have ascertained that the seat of stricture is different from what it was generally supposed to be, and that it rarely, if ever, extends beyond the bulb of the urethra, and also that the contraction, instead of being continuous or affecting a considerable portion of the canal, as formerly believed, is never more than a ring, generally narrow, and never exceeding a moderate width. In order to ascertain the precise situation of a stricture, I have devised an instrument, which enables the operator to divide it with unerring certainty; and I have provided a catheter, so fashioned as to protect the patient from any inconvenience during the forty-eight hours which should elapse before it is withdrawn from the bladder. Now, a gentleman who had been educated in Edinburgh, and frequently witnessed this operation performed, without the slightest trouble or embarrassment to detract from its beneficial effect, lately went to London, and naturally desiring to see how the process was performed there, visited a hospital where it was publicly announced.

"You may imagine his astonishment when he saw the operator proceed to cut into the urethra upon a silver catheter, which afforded no guide to the seat of stricture, and extend the incision, according to his own statement, all the way back to the triangular ligament, beyond the region subject to contraction; while, from the swollen and fistulous state of the scrotum, it obviously existed in the anterior part of the canal. The stricture, therefore, not being divided, it was found impossible to pass a catheter, and the operator next introduced, at the orifice of the urethra, a *bistourie cachee*, or sheathed blade, which was conveyed back to the part where the external incision had commenced, and was then drawn forward, with its cutting edge expanded, so as to notch the narrow portion sufficiently to permit the introduction of the common catheter. The patient, bleeding profusely, and without any bandage to retain the catheter in its place, was then bundled off to bed. What became of him there I do not know, but if the result proved what it promised to be, I have no doubt that it will be produced at the next medical discussion upon this subject in London, as an argument against the operation, which, it will be said, was in this case performed with the greatest possible 'dexterity.'

"You may be assured that there are few more dangerous members of society than those empty-headed operators who claim confidence merely on the ground of possessing 'good hands.' They are easily recognized by their simpering and swaggering and flourishing of their knives, as if the sole object of an operation were to make incisions, without reference to the consequences. They unconsciously inflict mortal wounds with smiling countenances, and are quite satisfied with the applause of those well-informed spectators who estimate surgical skill, not by results, but by the hands of a stop-watch. Such silly exhibitions, to call them by their mildest title, present a sad contrast to the conduct of an experienced seaman, who guides his vessel through an intricate channel. Well aware of the dangers which beset his progress, but confident that knowledge of their position will enable him to avoid them, he stands regardless of all the eyes around him, with every faculty of his mind concentrated on the course to be pursued. Calmly and steadily he makes the wheel revolve, and the ship glides safely into port. It will be well for you, and still better for your patients, if, endeavoring to imitate this example, you eschew the coxcombry of dexterity, and seriously devote yourselves to the consideration of how, in each particular case, the greatest amount of relief can be afforded, and the result rendered most securely successful."

The reader will observe that I have often objected to Mr. Syme's mode of treatment, but while I have been compelled to do this, it does not alter my faith in his surgical skill. He uses such remedies as stand most prominent, outside of the Eclectic profession. Of most of our concentrated remedies, Mr. Syme could know nothing, as they are of recent American manufacture. I have no doubt that Mr. Syme will use them with pleasure when they are brought to his notice, for he is not so prejudiced as to refuse to examine for himself the value of any agent which is to assist him in curing disease. The only complete treatise on the concentrated agents to which allusion has been made in this work, is that of my colleague Professor G. W. L. Bickley, entitled "Positive Medical Agents," to which the reader is referred.

The writings of Mr. Syme I have found scattered over several volumes and through various medical journals, so that my labors of compilation and arrangement have been both tedious and difficult. I have endeavored to bring his work down to the present time, and though some of his articles were written years ago, they are none the less valuable, for he has not seen fit to alter or modify them in the last edition of his works.

As an operator, perhaps Mr. Syme has no equal in the world, and as a logical writer he is unsurpassed. Brevity is his sin—and a very commendable one it is. The reader of his works is at once led directly to the subject, and without embarrassment shown how to treat the case. I have endeavored to do Mr. Syme justice, and I trust the American profession will not be inappreciative of his merits.

No. 90 *Seventh-street, Cincinnati, May* 1, 1857. R. S. N.

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PRINCIPLES

AND

PRACTICE OF SURGERY.

CHAPTER I.

INFLAMMATION.

INTRODUCTION.

With the exception of the cuticle and its appendages, the nails and hairs, which are destitute of vessels, and incapable of performing any vital action, all the solid part of the human body is composed of vascular tissues, which consist of bloodvessels and nerves interwoven together through a basis of cellular substance. These tissues are everywhere permeated by the blood, which supplies them with nourishment for their growth and renovation. Some of them, as those of which the bones and ligaments are formed, seem to perform no living action, but that of duly appropriating the nutritious matter thus afforded, so as to preserve their structure in a healthy or perfect state, and this is named their Nutritive Action. Other tissues, as the muscular and glandular, in addition to the power of nutrition, possess various remarkable vital properties, which are named their Functions.

Both the nutritive and functional actions of the tissues are subject to disorder. When the former are perverted, alteration of the structure necessarily results, as is seen in the growth of tumors, or the formation of ulcers; but the latter may be disturbed without any obvious change of this kind, as when the digestion of food or the secretion of urine is imperfectly performed, without any perceptible difference in the stomach or kidney. Derangement of function, however, is no doubt most frequently connected with alteration of structure, and is very apt to lead to it. Disordered action, whether of function or nutrition, constitutes Disease, to remedy which is the object of Medicine.

As the field of medicine is thus very extensive, it has been divided into Physic and Surgery — the former department comprehending

internal complaints, while the latter includes those which are situated externally, or require for their treatment the use of external means. The art of Surgery consists in the performance of the various manual duties required in the employment of these means; and the science of Surgery directs their choice and application.

In the diseases which constitute the surgical department of medicine—if we except those depending on the introduction of foreign substances, the retention of secretions, and the presence of concretions in the cavities and canals of the body—there is always alteration of structure, which may be owing either to morbid nutrition, or to external violence. In both cases, reparation is to be effected, not by mechanical art, but by the action of the nutrient vessels; and all that the surgeon can do, is to remove obstacles out of the way of their salutary operation. When he speaks of healing a wound, for instance, he means nothing more than placing the part concerned in the most favorable circumstances for undergoing this reparatory process. It is, therefore, necessary, in entering upon the study of Surgery, to become acquainted with the various actions of these vessels, whether tending to the injury or reparation of structure. And as it very generally happens, that there is interposed, between the natural actions and those alterative of the structure, a diseased condition, which has been named Inflammation, this must be considered in the first place. [It is very doubtful whether Mr. Syme recognizes Inflammation as a *disease*, or simply as an altered condition; for in his definition of inflammation, he defines it to be "*a perverted action*," etc. As the reader proceeds, he will observe that neither myself, nor the Eclectic Surgeons of America, regard inflammation as a *disease* in the same sense that we call cholera a disease. Nor is the Eclectic profession alone in the rejection of the idea of inflammation being a disease; for many of the most eminent Allopathic writers either seriously doubt or positively deny that it is such. Like many other generally accredited theories, the doctrine of inflammation has been seriously investigated of late years by those every way capable of doing the subject justice. I shall have occasion, presently, to examine briefly the theory of inflammation.—R. S. N.]

SYMPTOMS OF INFLAMMATION.

By Inflammation is understood that condition of a part in which it is red, swelled, hot and painful, along with more or less fever, or constitutional disturbance. But there is still another circumstance of this morbid state, which, though it has not been so much noticed, is really the most important of the whole; that is, perversion of the vital action in the part affected, which is truly essential, and never-failing, while the other symptoms are extremely variable in their degree, and not even constant in their existence.

Redness.—This symptom is owing to distension of the vessels which convey blood; to blood being admitted into those which usually appear to receive only the colorless part of it, whether this be owing to the red globules not entering at all, or only so few at a time as to conceal their color, since it is only when existing in considerable assemblages that they appear red; and also to bloody effusion into the interstices of the structure concerned. Inflammation of the conjunctiva affords one of the best examples of these changes.

The redness varies considerably in shade. It is generally bright and florid, like that of arterial blood, but it often has a yellow hue, and still more frequently is dark, or almost purple. The yellow tinge is most frequently observed along with derangement of the biliary secretion, as in erysipelas; but the dark color depends on different circumstances, the discrimination of which is of great importance in practice. It was formerly thought a certain indication of putrid tendency, or proneness to die from weakness, and an unquestionable indication for administering wine, bark and cordials. It is now observed to depend frequently on obstruction of the respiratory function, preventing the blood from undergoing its proper change. It is seen also when the venous circulation of an inflamed part is impeded.

Swelling.—This symptom depends partly on the enlargement of the vessels, but chiefly on effusion of the serous or albuminous parts of the blood, or the blood itself, into the cellular texture. It consequently varies with the vascularity and laxity of the tissue concerned. Thus inflammation of the conjunctiva is attended with great swelling, while that of the cornea is accompanied by hardly any.

Heat.—This is a very characteristic symptom of inflammation, and, together with the redness, has, no doubt, led to the choice of a title for expressing it, since in all languages the term used for this purpose denotes burning. Like the last mentioned symptom, the sensation of heat varies with the part affected. It is most remarkable in the skin, and in some parts of the mucous membrane, as the urethra.

It was formerly believed that the patient's feeling of heat depended always on a real and proportionate elevation of temperature; but the application of a thermometer at once proves this opinion to be incorrect. John Hunter investigated the subject, and came to the following conclusions: 1. That the heat of an inflamed part is not commensurate with the patient's feelings. 2. That it does not exceed the standard or central heat of the individual. 3. That the greatest increase of temperature takes place in those parts which are farthest from the center, and naturally coldest.* Thus inflammation of the scrotum, induced by laying open the tunica vaginalis, raises the thermometer from 92°

* Hunter on inflammation, p. 296, 4to.

to 98°. But if the disease elevates the general heat of the individual, the temperature of the inflamed part rises to the same degree, as in erysipelas, where the heat of the inflamed skin is frequently 104°.

Pain.—This is one of the most constant symptoms of inflammation. It is generally proportioned to the violence of the disorder and the sensibility of the part affected; but there are many exceptions to the latter part of this rule; and some tissues, as those of the osseous and fibrous kinds, which are not at all sensible in their healthy state, occasion the most acute suffering when inflamed. The sensibility of every part in the body is increased by inflammation; and if this has ever been denied, it must have been from confounding insensibility to those stimuli which require, for making an impression, that the organ to which they are applied should perform a functional action for their reception, with insensibility to chemical and mechanical stimuli, which always excite more sensation when applied to an inflamed part, than to one in a healthy state. Thus, during inflammation, the eye may be unfit for vision, and the nose for smelling, while the impressions of light or odors produce a painful effect. The pain of inflammation varies in kind as well as in degree; being sometimes hot and burning, as in the skin and mucous membranes—at other times sharp and cutting, as in the serous membranes, or dull and aching, as in the bones.

It is impossible, in the present state of our knowledge, to account for these varieties in the pain, or even for the existence of pain at all. It is usually ascribed to the swelling that accompanies inflammation, causing pressure on the extremities of the nerves, whence, it is said, the most compact tissues occasion the severest pain; but this explanation is not satisfactory, as many which possess the softest and most yielding structure excite excruciating pain when they are inflamed, of which the mucous membranes afford a remarkable example.

The pain is not always felt at the part affected, but often at a distance from it, as at the point of the penis when the bladder is inflamed, in the right shoulder during inflammation of the liver, or in distant parts of the limb, when the joints are the seat of disease. We are sometimes able to account partly for this by the nervous communications, but more frequently it is quite inexplicable, though highly deserving of attention in a practical point of view.

Derangement of Functional Action.—This symptom of inflammation cannot, of course, attend the inflammation of every tissue, and must be confined to those which possess some vital property in addition to that of mere nutrition. It is sometimes, however, the only symptom present, or at least the only one that can be recognized; as when the organ affected is contained in an internal cavity. When the function of the organ is to receive the impression of some external stimulus, as

that of the eye or the nose, it is performed either imperfectly, or not at all; and hence, as already observed, some have been led into the error of supposing that the common sensibility of parts is occasionally diminished during inflammation.

Derangement of Nutritive Action.—In addition to the serous and bloody effusions into the cellular texture, which always take place to more or less extent, the most frequent indication of a change in the action of the nutritive apparatus is softening of the tissue concerned. In some cases, this alteration is so remarkable, that it has been thought necessary to designate it by a peculiar expression—viz., *ramollissement*. This effect of inflammation is, on many occasions, of great importance, but at present deserves attention chiefly as affording evidence that the nutritive process is not performed in its usual manner. Another fact which leads to the same conclusion, is the rapidity with which putrefaction proceeds after death, in parts where inflammation has previously existed. It may be said, that the more than usual proportion of fluids congested by the diseased action may account for this speedy decomposition, without supposing that the constituent particles are altered by it in their relation to each other. But, in such a view of the matter, we ought to observe the same putrefactive tendency equally strong in parts where blood has been simply effused into their texture, which is not the case.

Constitutional Disturbance.—The disturbance of the system, or Fever, as it is called, which accompanies inflammation, consists of an alteration in the performance of all the functions of the body. The phenomena, which are in consequence exhibited, vary very much, according to peculiarities of the patient's constitution, and the part which is inflamed. Generally the pulse is hard and frequent, beating from 80 to 120, and in children much faster—the respiration is hurried—the face is flushed—the eyes are suffused—the tongue is white and loaded—there is no appetite—inordinate thirst—headache—constipation—scanty urine—dryness of the skin—confusion of ideas or delirium—and prostration of strength in the voluntary muscles. This state of general disturbance, which is named Inflammatory or Symptomatic Fever, does not always accompany inflammation, and is usually proportioned to the violence of the local symptoms. Its type or character also varies, as already mentioned, according to the part or patient affected. The pulse may be small, feeble, and irregular or intermittent—the tongue brown, smooth and glazed—the countenance dark-colored, contracted and anxious. These varieties in the symptoms of fever demand great attention, as indications of the seat and degree of the local disorder, and as guides for directing the remedial measures. The state of the blood also, in this condition, requires particular consideration.

When blood is taken from one laboring under inflammatory fever, instead of coagulating, as usual, into a homogeneous red tremulous mass, it throws up to the surface a clear transparent fluid, which coagulates into an opaque, buff-colored, tough, membranous-looking crust, which is named the buffy coat. It is usually about a quarter of an inch thick, and presents a concave surface, owing apparently to preserving its original extent, while the subjacent part of the clot contracts during the separation of the serum. Whatever hastens the coagulation of the blood tends to prevent the formation of the buffy coat. Thus weakness of the individual, smallness in the quantity of blood abstracted, exposure of it to an extensive surface of dead matter, and its being abstracted in a small stream, or by drops, all oppose the appearance in question. The formation of the buffy coat has, therefore, been supposed to depend merely upon slowness of coagulation, allowing the red particles to descend, and leave the fibrinous portion pure; but there is certainly something more than this concerned in the process, since the tough yellow crust under consideration differs materially in appearance from the fibrinous mass, which is obtained by washing away the coloring matter of healthy coagulated blood, and when the disposition to its production is strong, it takes place notwithstanding the most rapid coagulation; while blood drawn from an animal in health may be retained for a long time fluid, without showing any trace of it. The buffy coat, though very generally, is not invariably observed during inflammatory fever; and it also appears occasionally, though no inflammation exists. Pregnancy and violent agitation, whether of body or mind, are apt to cause its formation. It is difficult to conceive how the constituent proportion of fibrin can be actually increased, as has been supposed; but there seems little reason to doubt that there is a preternatural tendency to its separation from the blood, both while it circulates in the vessels, and after it is withdrawn from the body.

NATURE OF INFLAMMATION.

The heat, redness, and swelling which attend inflammation, naturally suggest the idea that the blood of the part is increased in quantity and moving force. Before the circulation of the blood was discovered, and it was supposed that this fluid moved from the liver, then regarded as the source of its formation, to all parts of the body, inflammation was referred to a preternatural flow, or determination of its stream in some particular direction. After the discovery of Harvey, that the blood incessantly performs a double circulatory movement, the heart being regarded as the great or rather sole cause of its motion, it was readily concluded, that inflammation must be owing to some obstruction, which checked the progress of the blood forward,

while the *vis a tergo*, viz. the contraction of the heart, continued in operation. This obstruction, it was thought, might proceed from one or more of the following sources; morbid lentor of the blood — *error loci* of the globules — and spasm of the extreme vessels. The two first of these were the doctrines of Boerhaave, the last that of Hoffman, but better known in this country as advocated by Cullen. The morbid lentor or thick state of the blood was inferred to exist from the apparent redundance of fibrin, as shown by the buffy coat; and it was thought that the small vessels, being unable to transmit their contents, thus rendered more viscid than usual, might occasion the obstruction in question. The same effect seemed likely to result from an *error loci*, or entrance of the globules into vessels not fitted for their reception. This opinion rested on the belief that the structure of the globules was very complicated, each red one consisting of six serous, and each serous of six lymphatic globules, for the conveyance of which, vessels of three different sorts and sizes were provided as channels of communication between the arteries and veins. In this view of the case it seemed probable that a globule getting into a wrong vessel might obstruct all those behind it. The third doctrine of obstruction referred it to inordinate contraction of the orifices which the capillary vessels were supposed to possess.

It will be shown below that mere obstruction is not sufficient to account for the symptoms of inflammation, but the hypothetical causes which have been mentioned are inadequate to produce even this effect. The blood, so far from being more thick and viscid during inflammation, is now ascertained to coagulate more slowly, and to allow the red globules to subside more readily than usual. The free communication which exists between neighboring vessels, through means of the anastomoses of their branches, would surely prevent any inconvenience from being caused by *error loci*, granting the possibility of such an occurrence; and the doctrine of spasm is objectionable, to say nothing of other grounds, on the very serious one, that the alleged mouths of the vessels are found not to exist.

A different explanation of inflammation was given by Vacca.* He thought the first step in the process was debility of the capillary vessels, which allowed them to be distended by the current of blood passing through them. The blood thus accumulated would cause heat, swelling, redness, and pain, and the action of the heart consequently becoming affected, the blood would be driven with more force into the arteries, which again would contract with violence proportioned to the extent of their dilatation.

Vacca rested this doctrine chiefly on its satisfactorily explaining the

* Vacca de Inflammationes Natura, &c., 1765.

phenomena of inflammation, and also agreeing with circumstances frequently observed in the cause and cure of this morbid state. But his followers have called into their assistance, and indeed considered as their strongest argument, the appearances which are observed in the capillary vessels of inflamed parts when they are surveyed through a microscope. Their statement is, that, as inflammation commences and proceeds, the globules move more and more slowly, and at last cease to do so at all, while the vessels become greatly enlarged and distended.

These observations, though regarded by many as conclusive in favor of the doctrine of debility, seem, upon a more careful consideration, rather opposed to it; for relaxation of the vessels ought to favor the transmission of their contents, and the retardation that might be expected from their increased capacity ought to be extremely inconsiderable. But it has always been remarked, that the globules begin to move slowly *before* the vessels dilate,* and that the dilatation increases in proportion to the slowness of their motion. It may be further observed, that if the blood of an inflamed part were stagnant, the color of it ought to be dark, like that of venous blood, while, on the contrary, we know that, unless in particular circumstances, when the difference can be accounted for, it is always bright and florid; and also, that if the enlargement of vessels necessarily implies debility, blushing, the turgescence of glands, and the erection of the penis must then be considered the effects or indications of debility.

John Hunter, in defining inflammation, said it was simply an increased action of the vessels;† wisely observing that dilatation was as much an evidence of power as contraction. This definition, however, is plainly open to objection, for the symptoms, which have been mentioned above, clearly show that the natural actions during inflammation are not merely increased but altered. And here it may be noticed, that a great mistake has been committed in constructing theories of inflammation, by limiting them to the explanation of the least important though certainly the most obvious symptoms, viz: the redness and swelling, while the heat, pain, and disturbance of the vital action, whether nutritive or functional, have been treated with neglect.

As the secretory and various other important actions, which suffer derangement during inflammation, depend in their healthy state upon the nervous energy, or power of life, and as all our efforts have proved insufficient to approach the truth more nearly in their explanation than by referring them to this source, we must be satisfied with doing the same in regard to their derangements; and being thus obliged to admit, as the essence of inflammation, disturbance in the nervous energy of the part, we may employ this also to account for the changes

* Wilson Philip, Med. Chirg. Trans. Vol. xii, p. 407. † P. 278.

observed in the circulation, which have never been satisfactorily explained otherwise.

The various local determinations of flows of blood so constantly occurring in blushing, secretion, the turgescence of the erectile tissue, the growth of tumors, the formation of the fœtus, etc., plainly prove that the motion of the blood is not entirely owing to, or under the control of the heart. When physiologists began to recover from the first dazzling effect of Harvey's brilliant discovery, they saw the necessity of taking into account some other motive power beside that of the heart, and much dispute has since existed as to the respective shares of it which ought to be assigned to the arteries and their capillary terminations. It would be easy to show that any supposed conditions of these vessels as to enlargement or contraction, however energetic or alternated, are inadequate to account for the phenomena in question, and that we must, therefore, infer the operation of some other power in them than that of muscular contractility. But this is unnecessary, as there are some vessels in the system which, beyond all dispute, possess such a power. The vessels of the fœtus, and those which absorb the chyle, can perform their office only by exerting an attractive force on the fluids exterior to them, similar to what must be exercised by the roots of vegetables. And if we admit the operation of such a power in some parts of the vascular system, we may not unreasonably suppose it to exist wherever similar effects are produced. The absorbing property, which is now acknowledged to belong to the veins, can hardly be explained in any other way :—and then we have only to go a single step farther to grant it to the venous capillaries, which communicate with those of the arteries.

If we allow that the motion of the blood through the capillaries is influenced by the vital power of the vessels, the explanation of all the symptoms of inflammation becomes equally easy and obvious. It has already been found necessary to suppose that there is a disturbance of the nervous energy in order to account for the various alterations of vital action; and the same power, which is thus disturbed, being regarded as controlling the capillary circulation, a corresponding derangement of it ought to be expected.

Inflammation may, therefore, be defined to be—*a perverted action of the capillary system, generally attended with heat, pain, redness, and swelling.*

[I define inflammation to be a *physiological* condition, set up in extraordinary cases for the removal of *pathological* states, that have been induced by certain well-defined causes, which latter may be either internal or external, and that as the removal of the inflammation is not to be effected without first removing the cause, inflammation is essentially a natural effort of the system to remove either foreign sub-

stances, or to effect the repair of external injuries. I am aware that this is not the theory which has been adopted, nor is it the one upon which surgical practice has been founded; yet I am quite confident that it is the true definition of that state, and further, that the position can be well established from the recorded experience and opinions of those who maintain that inflammation is a disease. It depends upon our view of inflammation, whether or not our practice is a rational one. In vol. 3, p. 285 of his work on inflammation, Prof. John Hunter tells us that "Inflammation, in itself, is not to be considered a *disease*, but as a salutary operation, consequent either to some violence or some disease," and that it "is an action produced for the restoration of the most simple injury in some parts, which goes beyond the power of union by the first intention." Again, on p. 293, he says: "Pure inflammation is rather an *effort* of nature than a disease." Also, on p. 286, he holds nearly the same language when he says: "From whatever cause it (inflammation) arises, it is an effort intended to bring about a reinstatement of the parts to nearly their natural functions."

This, in my opinion, is good doctrine, and comes from one oftener quoted than any writer on the subject of inflammation. Let us suppose a case or two, to determine whether this doctrine will hold good or not. A person has a splinter forced under his finger-nail, and so broken that extraction is impossible. Does not inflammation immediately supervene? then follow suppuration, granulation, and cicatrization. Does not every one see that this, under the circumstances, is all natural? Here the splinter was accidentally introduced into the finger—as a consequence inflammation supervened—suppuration and cicatrization followed in order. What caused the inflammation but the splinter? The splinter was a cause of irritation—the first process in the work of expulsion was set up to effect its ejection. Suppose that no inflammation had supervened, would the cicatrization of the part have been effected? Certainly not. Again, if inflammation be a disease, it would have been a duty to have suppressed it; and in case such a course had been pursued, would the part have healed? The merest tyro would here have been able to answer, No. I select from Simon's Pathology the following case:

"A man had a sudden and severe pain in some part of his body, accompanied by a rush of blood to the painful spot, and by the disposition to the pouring out of serum there. This obviously is not a condition of health. But, if you knew that a quantity of boiling water had just been dashed on the part, you would be disposed to transport the term *unhealthy* from the effect to the cause—from the man to the kettle. In fact, the man would have been *unhealthy* if this redness and vesication *had not* occurred." Again, Prof. Paine,

in his Institutes, p. 465, informs us that "Inflammation takes its rise in purely physiological conditions, and holds its progress and decline under the same great natural laws of the constitution." Watson, in his practice, tells us that "it is by inflammation that wounds are closed and fractures repaired—that parts adhere together when their adhesion is essential to the preservation of the individual, and that foreign and hurtful matters are conveyed safely out of the body."

Now, none can fail to perceive that these several positions are correct, but it is, indeed, remarkably strange that the practice of surgeons does not generally correspond with these doctrines.—R. S. N.]

Inflammation terminates in various ways. Sometimes all the symptoms disappear, and the part resumes its natural condition, when it is said to terminate in Resolution. At other times it ends by destroying the life of the part; and is then said to terminate in Mortification. It also terminates in various actions, producing alteration of the structure, or the separation of matters from the blood, differing in quantity or quality from those naturally secreted by it. Of these, the most remarkable are the following: The formation of a peculiar fluid named Pus, which is called Suppuration—the Effusion of serum or lymp, *i. e.* the fibrin, in a state resembling the buffy coat—the removal of solid or fluid parts of the body, which is named Absorption—and the production of some solid structure, differing in quantity or quality from that naturally existing, which may be designated Diseased Nutrition.

Inflammation has been variously divided and named, according to its termination—the predominant local, and constitutional symptoms—the degree of its violence—and the part affected. Most of these distinctions, so far from simplifying the subject, have tended greatly to obscure and perplex it. Instead of causing inflammation to be regarded as a morbid action, always of the same nature, and merely modified in its symptoms and termination, according to the part and constitution affected, they have made it appear a group of dissimilar processes, arranged under one title, but widely and essentially different from each other.

Inflammation of particular organs and tissues is expressed in modern nomenclature by adding the termination *itis* to the anatomical title of the part affected, as Iritis, Gastritis, Phlebitis. For some parts the old and peculiar appellations are still retained—as Erysipelas for inflammation of the skin, Ophthalmia for that of the eye.

The severity of the symptoms also requires to be distinguished; for which purpose the terms Acute and Chronic are employed to denote the two extremes of violence, while the intermediate degrees are indicated by qualifying epithets. Acute inflammation frequently passes into the chronic; but the latter often exists independently and origin-

ally. When the inflammation is acute, it terminates one way or another in a few days at farthest, and sometimes even in a few hours; but when chronic, it may exist for weeks or months with little change. With acute inflammation, there is almost always symptomatic fever; with chronic, hardly any.

CAUSES OF INFLAMMATION.

The causes of inflammation, or circumstances which give rise to this morbid state, are very numerous and various. They may be divided into those which act directly on the part affected, and those which do so through the medium of the system.

[The causes of inflammation may be thus comprehended in a single group: Whatever influence—no matter how induced—which is capable of interrupting the normal circulation of either the blood, or the nervous force, whether by increasing or retarding their velocity, either directly or indirectly, is a sufficient cause, if the vital powers be existent in their native integrity, to insure the setting up of inflammation for their removal.—R. S. N.]

The direct causes of inflammation, or local irritants, as they are usually called, comprehend all the natural stimuli of action when excessive in degree or continuance; various animal, vegetable, and mineral matters, such as cantharides, croton oil, and tartrate of antimony, which are named irritants, from their effects, and every sort of violence, whether chemical or mechanical, which alters the structure of the body.

The effect of these causes varies with the irritability or tendency to excited action of the part or patient. Parts are generally irritable in proportion to their vascularity and sensibility. Thus the iris is more readily excited to inflammation than the cornea. But there are many exceptions to this rule; and particular tissues are most under the influence of particular irritations. The urinary bladder, for instance, is irritated by distension; and the joints, by forcible extension of their ligaments. Parts occasionally become more irritable than usual. The circumstance of having been previously irritated sometimes renders them so. Weakness or diminished power of action, also, as from interruption of either the nerves or bloodvessels, or any other cause, contrary to what one might expect, produces the same effect. Habit, or the continued exposure to an irritation, lessens its effect.

The differences observed in constitutional irritability are very striking and important. Sometimes they seem to depend on original or congenital peculiarities of the system; but very frequently proceed from the injurious effect of deviations from propriety in diet or exercise. They are also often connected with mental irritation, which has a powerful influence over the irritability of the body. In these different states of

the system, the same local irritation produces the most opposite effects; and while one individual may have his limb lacerated and the bone shattered without suffering so much inflammation as to occasion symptomatic fever, another dies from the intense action excited by the prick of a pin. The common expressions of a good and bad constitution are nearly equivalent to the possession of little or much tendency to suffer irritation from causes of disturbance; and the difference in this respect, as has been already observed, may either depend upon congenital peculiarity, or be acquired through circumstances connected with the mode of life.

[The doctrine of Original Conformation, or Congenital Structure, and its first impressment by a direct hereditary transmission from parent to child, has been long since exploded by the researches of American physiologists and pathologists; and even as used by Mr. Syme, is adopted more as a matter of convenience than otherwise. We are told that such a one inherited consumption, or cancer, or scrofula. Now the truth is, no such transmission occurs. The *tendency* — the cachexy — is transmitted; but not the actual disease. Children born of consumptive parents do not always have tubercle— so those born of healthy parents sometimes do die with consumption. No one expects to find children born of sickly, weak parents blessed with strong, vigorous constitutions; yet if, notwithstanding their weakness, these children be placed in circumstances favorable to health, they may, and most generally do, attain old age. On the other hand, children born of vigorous, healthy parents, and who possess fine vigorous constitutions, will assuredly fall victims to anæmic disease of some sort, if placed in positions unfavorable to health. The cerebellum alone predisposes to the development or non-development of those diseases most commonly called hereditary. For a general view of this theory, see Newton and Powell's Practice, Book I, Parts 1, 2 and 3.— R. S. N.]

A most important fact in relation to the effect of irritation is, that it always proves inconsiderable when another which had been previously in existence, and exciting disturbance, is removed by its means. The success of operations frequently depends on this principle, as when amputation is performed on account of a diseased joint, which has kept up excitement for a considerable time without too greatly reducing the patient's strength.

The indirect causes of irritation, or those which act through the medium of the system, constitute a difficult, but very interesting and highly necessary subject of study. One of the most remarkable differences between animals and vegetables is the mutual dependence of the component parts of the former. Though each part is induced to act by particular stimuli, and produces peculiar effects, the whole are so

connected together, that one can hardly be affected without causing more or less disturbance of others. Sometimes the whole system suffers, and then fever results; at other times the consequent disorder is confined to a part merely. This fellow-suffering, whether partial or general, is usually expressed by the term Sympathy. Various explanations have been offered to account for it, of which the following are most deserving of notice: 1. The anastomosis of Bloodvessels, as that of the epigastric and mammary arteries, to which has been attributed the fellow-suffering of the uterus and mamma; 2. Continuity of Texture, as that of the conjunctiva, and lining membrane of the nose, to which the sneezing caused by exposing the eyes to a bright light has been referred; 3. Nervous Communication, as that between the phrenic and cervical nerves, which has been supposed to account for pain being felt in the shoulder when the liver is inflamed; 4. The Medium of Sensation, as when stimulants applied to the nose cause sneezing, though they do not induce this effect during insensibility; 5. Participation in the same function, as when the breasts become painful in the early months of pregnancy. None of these explanations admit of general application in accounting for sympathy; and many cases of it are not explicable by any of them. But though the cause of sympathy is at present, and probably ever will be, beyond the reach of human understanding, the facts which are generally observed in regard to its manifestations are fair subjects of inquiry, and of the utmost importance in practice. Of these, the six following, or what may be called the laws of Sympathetic Action, deserve especial attention.

1. Disturbance of action in one part, occasions disturbance in others.

In a healthy state of the system, all the organs perform certain actions with a certain degree of vigor, and whenever any one of them has its activity either excited or diminished, more or less change ensues in the action of others, which may thus become disordered in whole or in part. The effect of excited action in causing sympathetic derangement is well known, as in the common case of fever attending inflammation; but the consequences of diminished action are more apt to be overlooked, though not less frequent, or less productive of serious disease. The most extensive and frequent derangement which occurs in this way, proceeds from interruption of the mucous secretion of the intestinal canal. All attentive practitioners have remarked, that, when the bowels become costive, various diseases are apt to break out in distant parts of the body. This has been attributed to irritation caused by retention of the fæces, and to the effect of an inflamed state of the lining membrane of the bowels,* but it may be more correctly referred

* Dr. Hamilton on Purgative Medicines.

to the interruption of the usual secretion.* Next in order, as a source of derangement, from diminution of usual action, ought to be reckoned the skin. The effects of checked perspiration, or mere chilling of the skin, in occasioning general fever and local inflammation, are constantly presented to our attention.

Whenever an accustomed secretion or action of any kind is suppressed, though there may not ensue indications of actual disturbance, there is always a strong disposition to it; and, therefore, all operations, even of the most trivial kind, ought to be abstained from in such circumstances, as the direct irritation proceeding from them, together with the indirect inducement to derangement already present, might probably occasion violent local and general disorder.

2. A diseased action may, from long continuance, become, as it were, adopted by the system, so as to occasion disturbance by its suppression.

The fact is well known to the vulgar, who have in consequence the greatest dread of interfering with local complaints of long standing, especially such of them as are attended with discharges. This prejudice is no doubt generally carried too far; but it should be carefully recollected, that excited and disordered action of a part, which has from habit ceased to irritate the system, cannot be suddenly removed without the risk of causing general derangement. Thus when disease of a bone has occasioned the discharge of matter for a number of years, amputation, especially in adults, is found to be almost certainly fatal.

[The above rule in reference to operations where the system has become accustomed to discharges, is not borne out in practice. And I now take the position, that if there be in the system a due amount of vital force, the operation may be performed with impunity at any time, discharge or no discharge. A case in illustration: In 1846, I was called to a man who had disease of the bones of the feet. For fifteen years there had been a constant discharge of pus, ranging from half a pint to one pint per day. The patient was very much emaciated; however, without hesitation, I amputated the leg below the knee, and this too without the least preparatory treatment; no difficulty followed, and in three months he had gained forty pounds, and is now a well man. This case alone defeats the cautious rule of Mr. Syme. In treating ulcers of the leg, I heal them at once, without regard to the time of the discharge, and always succeed. Of course, if the vital force had flagged until it was barely sufficient to maintain life, any disturbance of the system would result in death.—R. S. N.]

3. All parts of the body do not sympathize with equal readiness, but seem to be influenced by continuity of texture, contiguity of situation,

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*Abernethy on the Constitutional Origin of Local Diseases.

and participation in the same function. As examples, may be mentioned the connection which is very frequently observed between affections of the mucous membrane at different parts of the body, the suppuration of the cheek, which is apt to be caused by the irritation of a decayed tooth, and the fellow-suffering which is displayed by the breast and uterus in the derangements of each other.

4. Excited action of one part may take the place of that in another, the system seeming inadequate to the support of both.

This translation of disease from one part to another is named Metastasis, and constitutes a most important principle of practice, as being the foundation of what is called Counter-irritation, or the excitement of artificial disease for the relief of others more inconvenient or dangerous, as in the common case of a blister being applied to the chest to relieve disturbance of the lungs.

5. Pain, hemorrhage, inflammation, increased nutrition, and excited secretion, take the place of each other, so that they may be regarded as equivalents of action. Thus, in the disease named *tic douloureux*, an intensely painful affection, which usually proceeds from derangement of the mucous secretions, the most effectual relief is obtained by causing copious discharges from the bowels through the operation of powerful purgatives. The monthly discharges of blood from females ceases when the nutrition of the *fœtus in utero* commences, or when a large tumor is formed in any part of the body; it also does not appear while the secretion of milk continues; and when, independently of these conditions, it ceases to appear, local inflammation, as that of the eye, is apt to occur. The local abstraction of blood and the establishment of suppurating surfaces are every day practiced for the counteraction of inflammation. It is unnecessary to mention more examples of such counterbalancing effects; but it must be observed, that the exchange is more ready between some of these morbid states than others, which must be attended to in the use of counter-irritation.

6. General disturbance, or fever, however induced, is apt to terminate in some local affection; a part being, as it were, sacrificed for the whole.

Most people have what may be called their weak part, which gives way on such occasions, and in many acts like a safety-valve, by protecting organs of more importance, as when sore throat, herpetic eruptions of the ears, or erysipelas is apt to result from constitutional disturbance. This proneness to particular local diseases may be either congenital, or the result of habit. In the former case, it leads to what is called hereditary disease, of which gout may be mentioned as an example.

TREATMENT OF INFLAMMATION.

The great object in treating inflammation is to make it terminate in Resolution — that is, to subside and disappear without leaving any change in the structure or actions of the part. The most obvious step in the first instance, with this view, is removal of the cause which excited the disease, should it still continue in operation. When the cause is direct, this can sometimes be accomplished speedily and perfectly, as when a foreign body occasions disturbance by its presence. But when it is of an indirect kind, such as the suppression of some natural secretion or discharge, from the mucous membrane or uterus for instance, the process for removing it is generally tedious and difficult, requiring the careful administration of medicine, and strict attention to regimen. When the cause cannot be remedied at once, or when the inflammation continues after its cause has ceased to operate, which is generally the case, the morbid action requires the use of means for its suppression.

[I have been compelled to differ with Mr. Syme in some of his theories, and hence I find it necessary to differ from him in his mode of treating inflammation. The student must bear in mind, that I am endeavoring to so modify Mr. Syme's work, as to present him with not only the excellent operations of that surgeon, but to furnish him with those improvements which in reality constitute the superiority of American Surgery and Practice. Mr. Syme stands deservedly high in his profession; but that is no reason why his opinions are invariably correct.

Mr. Syme thinks, that "though the symptoms of inflammation naturally suggest bloodletting, it is perhaps less often really required than is generally believed. Blood may be generally and locally drawn—generally from the larger veins, or smaller arteries—locally from near the inflamed part. The veins are preferred because they are more easily opened and closed—the veins at the bend of the arm, the external jugular, and those of the hand and foot, may each or any of them be selected." This description of performing venesection is so exactly like the mode described in all Allopathic works, that I omit it, and refer to other works for the common mode of performing venesection and arteriotomy.—R. S. N.]

Effects of Bleeding.—The first effect noticed, is a diminution in the force and rapidity of the circulation, which is manifested by the pulse becoming slower and softer. By-and-by, the motion of the heart is so much weakened, that it no longer propels the blood with sufficient force to support the functions of the brain. The individual becomes pale—he complains of weakness and nausea, which sometimes proceeds to vomiting, but more frequently, the functions of the brain

becoming more and more completely suspended, he loses all power of sensation and voluntary motion—he is no longer able to stand or sit—there are frequently slight tremors of the muscles, and in some rare cases, violent convulsive contractions of them—he makes some deep inspirations and expirations—looks wildly about him, and falls into a state closely resembling death, which is named Syncope. Syncope occurs most readily when the patient is in an erect posture, and a very large quantity of blood may be withdrawn without inducing it if he lies horizontally. The most effectual method of recovering one from this state is, consequently, to lay him down with his head on the same level as his body. The quantity of blood which must be abstracted to induce syncope in ordinary circumstances is extremely variable. Sometimes several pounds may be withdrawn before its symptoms appear, and at other times a few ounces are sufficient for the purpose; the patient's mental alarm has a considerable share in producing the effect, but in general sixteen or twenty ounces are required.

When the patient is very weak, or very largely depleted, the syncope either passes directly into death, or is succeeded by an intermediate state, named Sinking. In this condition the pulse is small, feeble, and intermittent; the countenance is deadly pale, and bedewed with clammy moisture; the extremities are cold, and the patient has a distressing sensation of weakness. He lies in a dozing state; and when roused from it, takes some time to recollect his situation, often at first expressing himself incoherently. His breathing is uneasy, being performed with dilatation of the nostrils, and is frequently attended with slight crepitation, or mucous rattle in the chest. This state, after continuing for hours, or it may be even for days, terminates in recovery or in death; the latter being usually preceded by hiccup and vomiting.

When the quantity of blood abstracted is not too great, in proportion to the strength of the patient, there is a recovery or reaction of the system. After an ordinary syncope, the symptoms go off in the inverse order of their approach; and when the patient has completely regained his faculties, it is generally observed that the actions which were suspended are performed with a slight degree of excitement. This is most observable with regard to the pulse, which is rather more sharp and frequent for some time afterward than it was before, provided the patient did not labor under any febrile disturbance.

This excess of reaction is observed to be proportioned in degree to the strength of the patient and the quantity of blood withdrawn, provided it is not so large as at once to induce sinking or death; and, in circumstances favorable for its production, may become so excessive as to closely simulate the symptoms of inflammatory fever. The

pulse is extremely frequent, and has a peculiar jarring or jerking sort of character—the respiration is hurried—the face is flushed—the eyes are red and suffused—the patient complains of intense headache, and distracting noises in his ears—and when blood is drawn it exhibits the buffy coat, though hardly the cupped surface which is seen during inflammation. The local symptoms of inflammation are not wanting: and the brain, with its membranes, is the part which most frequently suffers; but the viscera of the thorax and abdomen are not exempt from risk.

This curious state, for pointing out which, we are much indebted to Dr. Marshall Hall,* may be induced either by one or two very large bleedings, or by a number of small ones, causing a continued drain on the system for days, weeks, or months; and accordingly, as it occurs in one or other of these ways, the symptoms vary in the degree of their violence or acuteness. It may terminate in fatal effusion on the brain, or some other important organ, in sinking, or in a return to health. Bleeding, as might be expected, though it affords temporary relief, is apt to increase the evil, either by making the state of excitement more quickly terminate in sinking, or by increasing the violence of its symptoms. Perfect rest, both of body and mind; cold applications to the head; gentle opiates; and the gradual operation of time, ought to be trusted to as the means of relief.

The discrimination between the symptoms of excessive reaction and those of inflammation, is of the utmost importance in practice; and the following observations as to the circumstances which modify the effects of hemorrhage are deserving of much attention.

In young subjects, that is to say children and infants, the power of reaction is feeble, and the risk of sinking consequently great; but if the immediate danger be surmounted, recovery is accomplished quickly and perfectly.

In adults who are weak from age or any other cause, there is also small power of reaction; but their danger of sinking is not merely in the first instance, and continues for a much longer time afterward, as the restoration to health is slow and imperfect.

In the healthy and robust individual there is always excessive reaction, unless the bleeding be so small as not to affect the system sufficiently, or so profuse as to cause sinking or death in the first instance.

Pain, fear, and the exhaustion produced by protracted fever, or the discharge of matter, increase the risk of sinking.

[As I am not preparing a prize essay, but am writing for practical surgeons, or those endeavoring to become such, I shall not seek to

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* Med. Chirurg. Trans., Vol. xiii, p. 127.

array authors of the Allopathic faith against each other, or expose the inconsistencies shown by different writers who base their philosophy upon the allopathic theory of bloodletting. I take the direct position that bloodletting cannot be serviceable in any case, and that *it is never necessary*. I shall state my reasons for entertaining this view fairly and candidly, and I trust that those who may differ with me will feel it a duty to disprove my position; for I am convinced that impartial investigation will develop more arguments and facts in support of my theory than I have either time or inclination to advance.

Bloodletting does not accomplish that which is claimed for it by the advocates of the lancet. Health depends not only on the amount of the vital force; but upon its due equilibrium. The vital force is in harmony with the circulation—with the blood. Where there is a deficiency of blood, there is also a deficiency of the vital force. The blood is the great agent by which all accretions are made to our living fabric. Our strength and recuperative energies are in proportion, not only to the quantity, but to the quality of the blood. In health, the proportion of white corpuscles to the red corpuscles, is less than in disease, hence it would seem that in disease our object should be to diminish the number of white corpuscles and increase the red. Venesection produces the opposite result. The red globules are taken and the white ones left. Purgation is liable to the same charge. With these facts before us, why then bleed? If it be answered, to equalize the circulation, I answer, that the force of the circulation will be reduced, and that the reaction is nothing more or less than irritation. Too many physicians bleed because the circulation runs its rounds with greater acceleration in inflammatory conditions than in health—they make a thrust at the symptom rather than at the cause. Again, even admitting that the venesection equalized the circulation, does it not greatly weaken the vital force? According to the Allopathic theory of revulsion and depletion, brisk purgation along with venesection is often resorted to. This practice is doubly erroneous, since the principle in either case is wrong. Bleeding a patient laboring under inflammation, though it may check for a while the inflammation, will also suspend the curative process and retard recovery.

In the case of a fractured limb, constipation or diarrhea supervenes, and the latter is always regarded as an unfavorable symptom. Let us inquire why so? Because nature demands *all* the vital force to repair the injury. Now bleed and purge your patient, and what is the result? You weaken or destroy the vital force, and the healing process stops. The inference then is, to increase and equalize this subtle agent—bleeding will not accomplish this end.

As the Eclectic branch of the medical profession discards the use

of the lancet and the appliances of local bloodletting, the next inquiry likely to arise in the mind of the reader will be, "How then do we treat inflammation and kindred conditions?" We endeavor to equalize the vital force—to equally distribute the circulation. This is not done by venesection, or by depletion of any kind, but by a tonic treatment, which so braces up the entire system of functions that no reaction can occur. If the blood and vital force are so strongly centered on one organ or viscus as to become a dangerous condition, the principles of revulsion are applied to the case. But commonly, general measures are those upon which we rely. To be more specific, I shall mention the classes of agents, and often the particular appliances. In our progress through Mr. Syme's work, I shall substitute our own remedies for those employed by him. This I do, because I cannot commend the agents employed by him, and because my experience in the use of those I shall substitute has been both extensive and satisfactory.

Bathing—As a remedial agent, in Surgery, is of vast importance. Of the various baths I prefer the alcoholic vapor-bath. It is used where it is desirable to get up an active determination to the surface.

The Alcoholic vapor-bath is superior to the simple vapor of water. It includes the latter, with all its advantages, in addition to the rare stimulating effects of the alcohol in a state of vapor. A considerable portion of the alcohol rises in *alcoholic* vapor, while the remainder, by combustion, forms a hot, *aqueous* vapor. For convenience and facility of application it is much preferable to the simple aqueous vapor-bath. It is thus applied. Place the patient on a solid, instead of an open-bottomed chair, with his feet in warm water and the blanket around his neck, and give him some warm diaphoretic tea. Then, instead of the tub of hot water, pour some proof-spirits, or any alcoholic fluid that will burn, in a tea-saucer or cup, and set it on fire. Take care to keep the vessel under the chair, as near the center as possible, where it will not scorch the patient or the blanket. (A woolen blanket is much the best, as cotton textures are far too combustible, and require peculiar caution.) If the vapor gets too hot to be borne, raise the blanket a little and let in cool air. Let the patient drink warm infusions till the perspiration starts, then give him cold water. If the spirits give out before you get through, be careful, in filling the dish, not to set fire to your whole supply. After continuing the operation long enough, or till the patient begins to feel fatigued or faint, wrap him in the blanket, and put him to bed. It is generally best to let him sweat there, without disturbance, for several hours. Then wash him off with weak lye, and change his linen. It is also a good plan to give the patient an alkaline-bath, *before* the vapor-bath.

This mode of inducing perspiration, I deem the best yet known, and I often have recourse to it, as well for local as general disease. It does

not prostrate so much as the simple water vapor, nor render the patient so liable to take cold afterward.

When the patient is very weak, the alcoholic vapor may be administered while he is still in bed. An apparatus described by Dr. Armstrong, of Dublin, will be convenient for this purpose. It consists of a large spirit-lamp, with a funnel inverted over it and attached to a sufficient length of tin tube with joints, so as to be placed and directed where desired; and a sort of cage made of half hoops to cover the patient from neck to foot, and separate the bed-clothes some six or eight inches from his body. This cage being placed over the patient, is covered with blankets, and receives the vapor and heat through the tube from the lighted lamp. Dr. Armstrong highly recommends this measure in rheumatic and other inflammatory fevers.

As a substitute for bloodletting—if there be such among the readers of this work as are determined to follow Mr. Syme and the books in general—I beg to suggest the system of Ligatures, which have been recommended by our practitioners. It is this: tie a handkerchief or other bandage around each of the arms and the thighs—by these you can suspend the flow of blood through the veins, while the arteries are not compressed, and hence will continue to pump into the veins as much blood as they can hold—in this way, you can remove from the general circulation an amount of blood which no practitioner dare draw with the lancet. Syncope can be produced as readily thus as by the lancet.

Purgatives or cathartics may be used as means of depletion, but they are never used by us in the treatment of inflammation. *Diaphoretics* are often used, and with the best results. I will show further on, how they act. *Astringents*, narcotics, sedatives, and counter-irritants are also much employed in surgery, all of which, I shall notice as they are noticed by Mr. Syme.—R. S. N.]

Purgatives.—These are substances that, when introduced into the intestinal canal, produce more or less irritation; the effect of which is a greater secretion from the mucous membrane, and increased contraction of the muscular fibers. In consequence of this double operation, the dejections are more frequent and copious than usual; and the patient is not only relieved in the way of metastasis, that is, from having an action excited at a distance from the diseased one, but also has those secretions restored, the suppression of which is frequently the indirect cause of inflammation.

Many different purgatives are employed in medicine; but the most useful in subduing inflammation are calomel, colocynth, jalap, rhubarb, croton oil, and sulphate of magnesia. The saline purgatives induce a very copious secretion from the whole surface of the intestines, while calomel is thought to act more particularly on the liver, by restoring

or promoting its secretion. The blue pill and rhubarb are very beneficial in gradually restoring these actions to a state of health when their disturbance has occasioned chronic inflammation.

Purgative agents are often introduced into the rectum with the view of hastening the effect of those administered by the mouth, or superseding the necessity of their use, when from any circumstance their employment happens to be inconvenient. The grand essential of these injections, clysters, or enemata, as they are named, is quantity sufficient to distend the rectum, since this is the proper stimulus of that gut. From one to two pounds of gruel, or simply tepid water, should be used, and made more or less irritating, according to circumstances, by the addition of common salt, olive oil, castor oil, sulphate of magnesia, or oil of turpentine, etc. Various apparatus used to be employed for the purpose of injection; but the simple and efficient contrivance of Read's syringe has superseded all the others.

[**Cathartics** may be defined to be agents which, in proper doses, *cæteris paribus*, always increase the number of alvine discharges. The same laws of reaction pertain to this class of agents which we noticed in observing the action of emetics. The results of cathartic action are not confined to the mucous membrane of the alimentary tube, but react on organs situated at a distance, through the medium of the nerves, and by the changes produced on the circulating fluid. To understand clearly the nature of cathartic action, we must notice briefly the organs and tissues on which this action is exerted. The lining membrane of the small and large intestines is but a prolongation of the mucous membrane of the stomach, and of the supra-diaphragmatic portion of the digestive tube, somewhat modified. The mucous membrane of the stomach may be regarded as a mere extension of the general cutaneous surface. The lining of the stomach and intestines is a part of the surface of relation—impressions made on any part of it are conveyed to the nervous centers, with equal rapidity. The mucous membrane of the intestines, etc., is the seat of many important diseases. In it are situated the glands of Lieberkuhn, Brunner, and Peyer, each performing important functions—the two first secreting mucus for lubricating the membrane, while those of Peyer have been, perhaps justly, regarded as the seat of those adynamic fevers which some of the French pathologists referred to the gastro-enteric mucous membrane—these latter glands also secrete putrescent materials from the blood, and give rise to fæcal odor. We generally find them inflamed, and even ulcerated, in fevers of a typhoid character. The secretions of the liver and pancreas are poured into the upper small intestines, and from their supposed agency in chylosis, these organs have been termed the chylopoetic viscera. Fæcal discharges may take place when little or no food has been taken; and as

they are of a morbid character, we must remove them in the treatment of febrile affection, since they are capable of inducing just such irritation as would result from the imperfect digestion of alimentary matter. If the secretions from the liver, the pancreas, etc., are suffered to remain in the intestinal canal, they will occasion serious irritation. Thus we must keep the bowels in a soluble condition, whether food has been taken or not. In the large intestines we may sometimes see the folds encumbered by hardened fæcal matter, which must be removed, or we get, as the result, an irritated condition, very unfavorable to health.

The whole intestinal tract is endowed with a sort of oscillatory motion, to which the term peristaltic action has been applied. This is controlled by the ganglionic nerves, which excite the muscular coat of the intestinal tube to contractions.

The intensity of this action is commonly governed by the mode in which the function of digestion is accomplished. Adjacent to this tube there are organs whose functions are subject to modification by the impressions made upon the intestinal canal. Thus we modify the action of the uterus. The effects of cathartics on the intestinal canal will vary according to the different agents and doses selected for exhibition. If the intestinal membrane be only slightly stimulated, chylosis will be augmented, and a laxative tendency induced. If the stimulation be greater, the exhalations will be increased, and the muscular coat, by sympathy of contiguity, will be stimulated, and the peristaltic action will be increased. Thus, the force of the peristaltic movement will always depend upon the stimulation exercised on the mucous coat.

The effects of a mild cathartic may be confined to a mere evacuation of the tube, and but slight general results be obtained. As the first evacuation will mostly consist of the mere contents of the canal, it is always desirable to have a second or third operation, in order to secure the removal of the secretions from the liver, pancreas, and such drinks as may have been taken. The presence of bile in the discharges only proves that the upper portion of the tract has been smartly stimulated, and not that the person is what is usually termed bilious. The special preference manifested by certain cathartics to act on different parts of the intestinal canal, enables us to affect distant organs by arousing the sympathy of relation. Suppose we wish to affect the liver or pancreas, we then administer those cathartics which are known to have a special affinity for the upper intestines, into which the ducts from those glands enter. Or if we wish to stimulate the uterus, we administer some cathartic manifesting a preference for the lower intestines, the colon, etc.

Every portion of the organism is capable of being impressed with

cathartics. They are by far the most general, and the most applicable revellents we possess. When given in such quantities as to produce hyper-catharsis, they rapidly reduce the vital powers, which results, no doubt, from the copious exhalation of the serum of the blood consequent upon cathartic action on the lining membrane of the intestines. Their depletive and revulsive character is often illustrated by their sorbefacient qualities in removing dropsical effusions. Some cathartics cause griping pains, some do not; some cause many evacuations, others but few; some leave the bowels in a torpid condition, others leave them in a soluble and invigorated condition.

Of all the cathartics used in medicine I prefer the following, which are recommended without hesitation: Podophyllin, a resinoid active principle of Podophyllum peltatum. In conjunction with agents, such as Sanguinarin, Leptandrin, and Phytolacin, it is a good substitute for mercury, and has every advantage over mercurial preparations. The Jalapin is also a good cathartic. Sulphate of magnesia, senna, cream of tartar, and other similar agents may be used, and occasionally croton oil may be necessary, though rarely. Rhubarb and jalapin combined may often be used also as a very efficient cathartic.—R. S. N.]

Diaphoretics.—These are remedies which, in the effect they produce, bear the same relation to the skin that purgatives do to the mucous membrane of the intestines. They increase the action of the skin, and are thus beneficial, either in the way of metastasis, or in removing the cause of the inflammation, by restoring a secretion which has been suppressed.

The salts of ammonia have a diaphoretic effect; but, being of a stimulating nature, are questionable remedies for subduing excited action of the system. The *Aqua Acetatis Ammoniæ*, however, may be given with much advantage in small doses, from time to time, after the force of the disease has been broken by other means. Ipecacuan is less objectionable in this respect, and the combination of it with opium, constituting Dover's powder, is often extremely useful. By far the best diaphoretic, however, for subduing inflammatory action, is the tartrate of antimony, given in small and frequently repeated doses, so as to maintain a slight nausea, or even occasional vomiting. The warm bath is a powerful diaphoretic, and would often be very advantageous if it could be procured; but the difficulties which usually attend its employment in private practice are so great as almost to proscribe it.

[It may not be always practicable or necessary to use the alcoholic vapor-bath; but when other means fail, it should never be neglected; and it may, and should, be often resorted to in the first instance. A moment's reflection will satisfy any one as to what *must* be its power in relieving local and internal congestion or inflammation; and expe-

rience more than confirms all that could be anticipated from it. By the stimulus of the alcohol, as well as heat and moisture, all the superficial vessels become and remain distended with fluid, containing probably three or four times their average supply, although the perspiration is all the time flowing out profusely, and rapidly diminishing the whole volume of the circulation. By supplying the patient freely with cold water, this general drain may be kept up for hours at a time, without any sensation of faintness, though the patient be kept (as in that case he should be) in an upright posture. Any sensation of thirst shows that there is a demand in the system for a supply of fluid. While the general amount of circulating fluid is thus lessened more effectually than by venesection, the remaining part is still constantly attracted away from the part in danger, to the most extensive and variable tissue in the system. The whole superficial part of the vascular system will remain filled to repletion for several hours after the operation. The measure is not only a revulsive, but a *rubefacient* counter-irritant to the surface of the *whole body*.—R. S. N.]

The vapor-bath is more readily administered, and may, perhaps, come into general use. All the apparatus required is a piece of lead or tin tube, three or four feet in length, a tea-kettle, and a blanket. The patient sits on a stool near the fire and covered with the blanket. The tube is attached to the spout of the kettle by one extremity, and has the other placed under the stool. The heat may be ascertained by a thermometer, and regulated by the degree of ebullition. Much benefit is frequently derived from the semi-cupium or hip-bath, and the pediluvium or foot-bath; and still more local baths are of great service, in the form of Fomentations and Poultices. Fomentation is generally effected by applying a piece of flannel, or a sponge, wrung out of hot water, and changing this, from time to time, as it cools, for the space of fifteen or twenty minutes. A flannel bag, containing chamomile flowers, and allowed to cool sufficiently after being boiled a short while, is preferred by many for the purpose; and a decoction of poppy heads also is occasionally employed. Poultices may be prepared from any substance, which, together with warm water or milk, constitutes a soft pulpy mass, capable of retaining the heat and moisture. Bread, barley-meal, and linseed-meal are chiefly used; but carrots, turnips, and leaves, such as those of spinach and hemlock, are thought preferable in certain cases. These articles are either inclosed in a thin linen or muslin bag, or placed directly on the part concerned, in which case it is necessary to spread some butter, or other oily substance, on the poultice, to prevent it from acting inconveniently to the surface of the body. Mr. Liston advises that, instead of poultices, some folds of lint, moistened with hot water, should be applied, and covered with a piece of oiled silk, contending that any benefit derived from these may

be thus obtained, with less trouble and risk of causing injurious relaxation. Heat is sometimes applied locally without moisture, as by means of a bag containing heated salt, but is then found to be not so efficacious.

Narcotics.—These are medicines which, without causing any real diminution in the power of the system, produce a temporary indisposition for action. Of these, the most useful are opium, tobacco, hyoscyamus, and belladonna.

[Gelsemin, the active principle of Gelseminum sempervirens; Cypripedin, the active principle of Cypripedium pubescens; Lupulin the active part of Humulus lupulus; Scutellarin, the active principle of Scutellaria laterifolia; Veratrin, the active principle of Veratrum viride, are also much used, and with excellent results, by Eclectic practitioners. The agents, however, recommended by Mr. Syme are all good, if used with a correct understanding of their real action. As our author is very brief on the subject of narcotics, I shall give what I understand to be the philosophy of action of narcotics in the system.

Narcotics, which we define to be agents that diminish nervous sensibility, and, in appropriate doses, stupify, are but little understood in relation to their mode of operation, notwithstanding their very general use for so many ages. They always excite, and then stupify. When given in appropriate doses, they much resemble sedatives in their action on the system. No matter how large the dose, we may always detect some excitement before the appearance of sedation. The pulse is quickened and is stronger, the skin becomes warmer and less moist, the impressibility of the nervous system is increased, the fauces become dryer than usual, and their ordinary secretions more tenacious. These symptoms of excitation soon pass off, and are quickly succeeded by evidences of sedation. The breathing is less rapid, the skin moistens, the pulse sinks to its natural standard, or lower, the impressibility of the nervous system is reverted; in short, all the symptoms of sedation are fully established. Sedation follows very closely an excitation when we have administered large doses of a narcotic agent. Brandy is a positive stimulant, yet when taken in very large doses, sedation so rapidly follows, that we observe but little augmentation of the pulse. By lessening the impressibility of the nerves, the functions of innervation and digestion are impaired, hence the well-known fact, that such narcotics as tobacco allay hunger; hence, too, narcotics do sometimes constipate by indirect action. If the dose administered should be large, the whole function of innervation will be blunted, the secretions much diminished, and even the peristaltic motion of the intestines may be almost entirely suspended. When there is inflammation in any part of the alimentary canal, we consider it proper to administer

narcotics, provided the dose be large enough to procure the full sedative effect. When physicians speak of restoring the secretions of an organ by narcotics, or any other class of medicines, they can only mean that they wish to remove a pathological condition, upon which the suspension of the secretions depend. I have already stated that the first effect of inflammation on a mucous membrane was a diminution of the common secretions, but which is again increased after the inflammation has existed for a time. This increased secretion is by no means one of health. We thus see that inflammation may, and does induce, two opposite conditions of the secretory functions, and the indications are alike, *i. e.*, to remove the pathological conditions which may be present. This will be effected in either case by a full sedative dose of almost any positive narcotic.—R. S. N.]

Astringents.—These are remedies somewhat similar in effect to those last mentioned. Cold, acetate of lead, and nitrate of silver, are the best means of this kind. Cold is more efficient in preventing than curing inflammation. It is of no use unless it can be applied either to the part affected or in its immediate neighborhood; and then only when the diseased action proceeds from direct irritation. The acetate of lead is used externally in solution, either alone or along with opium, in the proportion of two or three grains of each to the ounce. It is generally applied warm, and has great effect in allaying inflammation depending on undue irritability.

[The acetate of lead and the nitrate of silver have been totally discarded as external remedies from the Eclectic practice. We have so many agents that are greatly superior to these two agents that they are no longer spoken of by our surgeons. Almost any vegetable astringent, such as tannin or geranin, is greatly preferable; and the acetate of lead bears no comparison to the white oxyde of zinc, of which I shall have occasion to speak more particularly further on.—R. S. N.]

Pressure.—When the part or system is disposed to overact by the weakness of its power, especially when it is attended with œdematous swelling, pressure may often be exercised advantageously by bandaging.

Counter-irritants.—The means of removing inflammation which are included under this title, act on the principle of metastasis, and excite irritation of various degrees as to intensity and duration. The most gentle in their effect are named rubefacients, of which may be mentioned mustard, oil of turpentine, ammonia, gum ammoniac, camphor, and some of the mineral acids. Blisters or vesicatories are applications which, as the name implies, occasion blisters of the skin or elevations of the cuticle, by fluid effused under it in consequence of their irritation. The plaster of cantharides is most frequently employed for this purpose; but, when the effect is wished to be strong and

immediate, recourse may be had to boiling water, or the concentrated mineral acids.

So soon as the blisters, caused in either of these ways, have risen, they ought to be cut, so as to allow the serous fluid which they contain to escape, after which the surface is to be dressed with some simple ointment. In order to prolong the irritation of blisters, it used to be customary to dress the raw part with an ointment containing savine leaves, or the powder of cantharides, which prevented it from healing, and maintained a discharge of matter. When continued irritation is required, it is now more frequently effected by the tartrate of antimony, which, when applied to the skin, either in solution or ointment, occasions a pustular eruption, that may be regulated as to extent and duration by the same means.

Another mode of causing permanent counter-irritation, is to institute a discharge of matter from a breach in the continuity of the skin. The introduction of a seton used to be, and still is, with many people, a favorite way of effecting this. The operation is most easily done with a seton-needle, an instrument shaped like a lancet, about three inches long, three-eighths of an inch broad, slightly curved, and having an eye in the handle. A fold of skin being held up, the needle is pushed through, and by its means a thread, to which a skein of silk or cotton, sufficient to fill the aperture, can then be introduced. In absence of the needle, a straight, sharp-pointed bistoury and probe will be found to answer nearly as well. In a few days, when the discharge of matter commences, a new seton may be passed by drawing it through the loop of the old one—and this may then be repeated daily. Issues are now more frequently employed with this view. They are merely breaches in the surface caused by the knife, caustic, or the actual cautery; that is, red-hot iron. When the knife is used, it should be pushed through a fold of the skin, and then some pease, or other foreign bodies, must be placed in the wound to prevent it from healing. The caustic potass is generally employed for opening issues. It may either be applied for three or four hours, made into a paste with soap or bread, and limited in its operation by a defense of adhesive plaster, having an aperture cut in it of the requisite size, or simply rubbed in substance upon the skin until the alteration of color and consistence indicates that its effect is sufficient. In either case, after the action of the caustic is completed, a poultice ought to be applied until the portion of the skin that has been destroyed separates, when some foreign substances, such as those already mentioned, must be introduced to prevent the opening from closing. The actual cautery is the best method of the whole, since the breach which it occasions requires no means for keeping it open, and does not heal until after many weeks or months, or healing applications are employed. The pain is severe,

but almost momentary, and, on the whole, much less than that of the caustic; while the counter-irritating effect is found to be greater than that of any of the other means. The iron should have a sharp edge, not more than the eighth of an inch broad, in order to burn the skin deeply, or rather through its whole thickness, since, unless this be done, in adults at least, the effect is very inconsiderable and of short duration. It should be used as hot as possible.

Counter-irritation may be effected also by moxa. This consists in burning small cones of the down of the Artemisia, or what answers equally well, provided the combustion be maintained by a blowpipe or bellows, raw cotton made into cylinders from one to two inches wide, and three-quarters of an inch thick. Every degree of irritation may be thus produced, from the slightest reddening to the most complete burning; but it is difficult to regulate the effect, and there seems to be no advantage in attempting to do so, as the other means which have been mentioned are more under command, and at least equally efficacious.

[Counter-irritation, which acts upon certain well defined laws of revulsion, is certainly not well understood, or physicians would not resort to blisters to produce it. It has been found that particular localities of the body are, though situated at a distance, in intimate sympathetic relation, and a knowledge of the location of these parts enables us to conduct counter-irritation rationally—*e. g.*, between the pulmonary apparatus and the surface of the arms and back part of the thighs, there is a very intimate relation—hence, in pulmonic diseases, we should select either of those locations as the point at which counter-irritation is to be established. In cerebral diseases, we should select the soles of the feet. In diseases of the peritoneum, womb and intestines, we should select the inner part of the thighs. The epigastrium should be irritated in complaints of the stomach; the nape of the neck in diseases of the eye; the hypogastrium in diseases of the bladder; the mama in diseases of the uterus, etc. Observation will lead to a further development of these counter-locations. In all cases where revulsion is necessary, irritation is better than vesication. I object to the blister, and by all means prefer the irritating plaster of the Eclectic Dispensatory. With this plaster we are enabled to effect everything that can be accomplished with the blister. In the use of cantharides, every physician knows that there is danger of suppression of urine, often troublesome. The tartrate of antimony recommended by Mr. Syme, is altogether too irritating; everything claimed for it can be effected with the irritating plaster; and if it be necessary to increase its power, this is effectually accomplished by sprinkling the part with a small quantity of Capsicin or Irisin; Granvill's lotion is also a favorite counter-irritant in my practice; the seaton has long since been

discarded from my practice; the actual Cautery and Moxa must indeed be seldom used.—R. S. N.]

Acupuncturation.—This remedy for inflammation must stand by itself. It consists in the introduction of slender needles, from one to three inches in length, into the inflamed part, by a gentle rotatory motion. No respect is paid in doing this to the importance of the organs, and the heart, stomach, arteries and nerves have all, it is said, been transfixed without any ceremony, though fatal consequences are reported to have sometimes resulted from this rash practice. No pain or other symptoms of irritation are in general produced, and, on the contrary, a diminution of the inflammatory indications is alleged to be frequently observed. This practice is of ancient origin, and held in much esteem in eastern countries, where, as in China and Japan, its employment is said to constitute a distinct department of the surgical profession. Some years ago it was tried pretty extensively in France, and also in this country, but it now seems to be going, or rather to have already gone, into disrepute, except in the treatment of Sciatica, where it is of the greatest service. It would seem that the effect of acupuncturation is proportioned not to the number of the needles, but to the depth they are introduced, and the time they are allowed to remain. I generally use only one, and leave it for two hours.

[Acupuncture is indeed a barbarous mode of practice, and it is to be hoped that it will continue to be confined to the East Indies, where it originated. In America, a bare trial or two only have been given it, our surgeons not seeing the necessity for such a rash practice. I trust that even Mr. Syme does not often resort to it.—R. S. N.]

CHOICE AND COMBINATION OF THE MEANS WHICH HAVE BEEN MENTIONED IN TREATING INFLAMMATION.

[Narcotics, sedatives and astringents are of the greatest service in treating inflammation. Emollients, and such other agents as these, to produce an equalization of the circulating forces, are to be preferred to direct venesection. As I shall introduce many cases, together with their treatment, from my own practice, I pass on to the consideration of another form of inflammation.—R. S. N.]

Resolution.—When the symptoms of inflammation subside, they do not leave the part affected altogether in its natural state. It generally remains for a time somewhat swelled, tender, and unfit for the performance of its duty, whence it requires rest, mechanical support, and gentle stimulation.

CHAPTER II.

MORTIFICATION.

SYMPTOMS OF MORTIFICATION.

When inflammation, instead of terminating in a return to the natural action, goes on to the destruction of the part concerned, it is said to terminate in Mortification. In this case, the part is not only deprived of sensation and voluntary motion, but is completely divested of all vital properties, so that no opposition being any longer presented to the exercise of chemical attraction, putrefactive decomposition at once commences. The appearance of a mortified part varies with its structure, just as happens in putrefaction. The soft, juicy tissues suffer most alteration, and the hard, fibrous ones least. The former are reduced at once to the state of a fetid pulp, while the latter retain their distinctive characters for a much longer time. Another circumstance that affects the appearance of a mortified part, is the degree of action which has preceded its death, since the softness and fetor will, of course, be greater if much fluid has been accumulated previously. This has led to a division of mortification into *moist* and *dry*, which is nearly equivalent to acute and chronic. These terms have also been employed to express the difference which depends upon the disease being of internal or external origin; in other words, spontaneous, or the result of injury.

The symptoms of mortification may be divided into those which precede its accomplishment, those exhibited by the mortified part, and those of the system which attend the local changes.

The symptoms that precede acute mortification are, generally speaking, those indicative of intense inflammation. The redness is bright and fiery, the pain hot and burning, and the swelling tense. As mortification approaches, the swelling, though it may rather increase in extent, becomes less tense, and pits on pressure. The skin acquires a yellowish hue, and exhibits dark mottled spots, or broad lines, over its surface. The temperature of the part becomes lower, and vesicles, containing a thin serous fluid, of a yellow, green or purple color, which are named phlyctenæ, make their appearance. This state is called Gangrene, or gangrenous inflammation. The part is not dead, but only threatening to die, and still admits of recovery, though a portion of it usually does perish. When the vital power is completely extinguished, the part ceases to be painful, it shrinks in proportion to its

previous distension, becomes black, brown, ash-gray, or buff-colored, and emits a peculiar characteristic fetor, which is nearly the same, whatever be the tissue concerned. It is then said to be sphacelated, or to constitute a slough.

The symptoms presented by the system, while these local changes are taking place, deserve great attention. They are nearly those which have been already described as attending sinking from excessive hemorrhage. The countenance is pale, cold and moist; the features seem small and contracted; and the appearance exhibits that ill omened aspect which has been designated the *facies Hippocratica;* the pulse is quick, feeble and irregular; the tongue is brown; and the lips frequently display small dark-colored scabs. The patient lies on his back completely collapsed, or, as it were, sunk down into his bed; he has frequent coffee-colored vomiting, and suffers from almost incessant hiccup. His body emits a peculiar odor, somewhat like that of moist earth. He sometimes retains his mental faculties entire; but more frequently falls into a dozing state, alternated with low muttering delirium. The breathing becomes obstructed by mucous effusion, and death closes the scene.

It is not easy to account for these constitutional symptoms. They have been attributed to the sphacelated part acting like a poison. But where sloughing is induced directly by chemical or mechanical means, even to a great extent, it is not attended with the effects in question. They have been also referred to the general exhaustion of power which the system suffers from the intense overaction that precedes the mortification. But this opinion is irreconcilable with the fact, that removal of the sphacelated part alleviates, and sometimes completely arrests, the constitutional symptoms. They have, therefore, as the only other explanation, been accounted for by supposing that the gangrenous or dying action extends itself over the system. Whatever be the true reason of the constitutional effect, there can be no doubt that it bears direct proportion to the importance of the part affected, and the violence of the action which precedes the destruction of its vitality.

In chronic or dry gangrene, the local changes are of a similar kind, but slower progress, and less striking character. The constitutional symptoms also are milder in a proportionate degree; and, indeed, when the case is purely chronic, in general altogether absent.

CAUSES OF MORTIFICATION.

The causes of mortification, or circumstances which induce inflammation to terminate in this way, may be referred to weakness, or defective powers of action; excessive irritability, or disposition to act; and excessive irritation, or excitement to act.

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Weakness.—The different tissues possess different powers of action. The tendons and shafts of the bones are very apt to die when inflamed—the cellular substance is less so, the skin still less, and the coats of the arteries least of all. The weakness which predisposes to mortification, may also depend on general debility of the system. In the advanced stage of fevers, the slightest irritations are apt to occasion sloughing. In weakly children, exhausted still farther by disease, this effect is, of course, more certainly produced; whence blisters are dangerous applications in such circumstances. Bad or defective food, and especially the use of unsound rye, when subject to the morbid condition named Ergot, causes such an unhealthy state of the system, that the slightest local irritation, or even inflammation occurring spontaneously, leads to extensive sloughing of the extremities.

A part merely of the body may be rendered weaker than usual, so as to be more prone to mortification, and this in various ways. When the principal artery of a limb is tied, there is no longer sufficient strength for carrying on the usual actions—the weakened part seems to make an effort to recover—heat, pain, swelling, with the other symptoms of inflammation, supervene, and if they are the least excited by external circumstances, soon wear out the diminished power that remains. Some attempts have been made to produce this effect, by impeding the supply of blood intentionally, with the view of destroying morbid growths inaccessible to the ordinary means of removal. The arteries occasionally become obstructed spontaneously, and this probably gives rise to the mortification of the toes, which not unfrequently happens in old people.

This *Gangrena Senilis*, as it has been named, was so well described by Mr. Pott, that his name is generally connected with it. The disease is seldom met with before the age of sixty. It occurs more frequently in males than females; and chiefly affects persons addicted to the pleasures of the table. It is usually preceded by uneasy feelings, sometimes amounting to intense pain in the foot, which, at the same time, is observed to be more or less swelled. A brown or purple spot then shows itself—most frequently in the neighborhood of one of the nails, but it may be in the sole or instep; the surrounding skin becomes red, hot and distended; the cuticle separates from the discolored spot, and exposes the subjacent texture in the state of slough. The morbid process then either gradually advances until the patient sinks under it at the end of weeks or months, or gradually relaxes in severity, and, ceasing to extend, permits a cure to be accomplished in the way hereafter to be explained. It has generally been supposed that the cause of this disorder consisted in a weakened condition of the foot, probably depending upon obstruction of its arteries, or ossification of their coats; and though the evidence in support of this

opinion is very defective, there can, at all events, be hardly any question as to the propriety of regarding weakness as the root of the evil.

Nearly the same effect is produced, when the blood is prevented from returning through the veins, by pressure or closure of them from other causes. The obstruction of one vein, even though the principal one of the limb, may produce troublesome consequences, but does not occasion mortification. If the principal artery be at the same time obstructed, death of the part is certainly induced.

Defect of nervous energy also predisposes to mortification. People who are paralytic in the inferior extremities, are apt to have sloughing induced by slight bruises. When the principal nerve of a limb is cut, or otherwise interrupted, a tendency to mortification is frequently observed at the extremity.

Irritability, or excessive disposition to act.—Weak parts are always irritable; and hence this cause of mortification is, to a certain extent, comprehended in the former one. But, independently of weakness, and in the most opposite state of part or constitution, there is frequently an excessive disposition to overaction. People who exceed in eating or drinking, or who do not take exercise in proportion to their food, are liable to this morbid disposition, which is also sometimes met with as an original peculiarity of constitution.

Excessive Irritation, or excitement to act.—Generally speaking, while other things are equal, the violence of inflammation is directly in proportion to the irritation; whence it follows that severe injuries, or other great and continued irritations, are apt to occasion mortification. Thus there is no constitution able to resist mortification from the shattering of a limb, or the infiltration of urine into the cellular substance.

TREATMENT OF MORTIFICATION.

The prevention of mortification requires the use of means proper for obviating the predisposing causes. If there is general weakness of the system from the use of improper food, or any other cause, it must be remedied by a more wholesome regimen, and, if necessary, supported in the meantime by the administration of wine, spirits, and other stimuli of speedy operation.* If any cause of local weakness exist in operation, it ought, if possible, to be removed; and the part which is weakened should be protected from all excitement. If the principal artery of a limb, for instance, has been tied, or if the part has been weakened by exposure to intense cold, every sort of local stimulating application should be carefully avoided, while the system

* See Note by Editor at the end of this chapter.

is at the same time protected from excitement. In the treatment of *gangrena senilis*, it is customary to prescribe large quantities of wine and spirits, with a corresponding allowance of animal jellies and other nutritious articles of diet, and to employ, under the title of hot or invigorating dressings, various articles of a stimulating nature. Under this treatment, the evil progresses, and even the opium that is often used, in compliance with Mr. Pott's advice, fails either to afford relief from the pain, or to check the advance of the disease. It would appear that, in this as on other occasions of deficient strength, while the power to act is lessened, the tendency to excitement is increased; and that, as cordials and stimulants cannot supply the vigor which is wanting, they merely increase the morbid disposition to inflammation. I have, therefore, advised, on theoretical as well as on practical grounds, that the diet of patients laboring under this disease should be strictly vegetable, and chiefly farinaceous; that they should be confined to the horizontal posture; and that the part affected should be enveloped in a thin linseed meal poultice of gentle temperature. The only addition to these means required, until the cure be completed, is the use of muriate of morphia, in doses proportioned to the patient's sufferings. If, instead of weakness, the irritability depends on strong power of action, it ought to be lessened by bleeding, purging, tartrate of antimony, and tobacco injections.*

When the mortification is completed, the slough should be cut away so far as is practicable, without encroaching on the living parts, in order to diminish the fetor; barm poultices are sometimes used with this view, but they generally occasion uneasiness. The chlorides of lime or soda in solution, diluted nitrous acid, or the *unguentum resinosum* with an equal quantity of oil of turpentine, are less objectionable applications; but nothing answers so well as a poultice of some soft soothing substance, such as linseed meal.*

The extreme prostration of strength that accompanies the acute form of mortification, peremptorily demands diligent support from wine and spirits. Bark used to be thought a sort of specific for supporting the system under this trial, but it is now less trusted to, and if given at all, the sulphate of quina is the preparation of it which ought to be preferred.

When the mortification does not cease to extend, it comes to be a question whether or not the surgeon ought to interfere with the knife. The objection to doing so is, that, though the constitutional symptoms may be alleviated, or altogether removed for a time after the amputation, the patient is in general soon reduced to the same state by sloughing of the cut surface. The most prudent course seems to be a middle

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*See Note by Editor at the end of this chapter.

one; to abstain from amputation when the mortification depends upon an internal cause, or one that cannot be removed, and to operate when the cause is external, or within reach. In the case of *gangrena senilis*, it would, therefore, be improper, while in spreading mortification, occurring as a consequence of gunshot wound or compound fracture, the patient should be afforded this chance of escape from otherwise certain destruction. It does not follow from this rule, however, that amputation should always be performed when mortification of a limb ensues from external irritation, since the most trivial injury is sufficient to induce it in an unhealthy subject. It is only when the violence of the action is fairly referable to the local cause, without supposing constitutional defect, that the operation can be practiced with propriety. Though the extent of mortification is not defined, if it depends upon a cause which is limited in its operation, as the obstruction of an artery at some ascertained part of its course, the propriety of amputation will be still more manifest.

Fig. 1.



In those cases where the mortification spontaneously ceases to extend, (Fig. 1,) as when it results from the exposure of a part to cold, it often becomes a question whether the process should be confided entirely to the power of the system, or be anticipated by amputation, in order to hasten recovery, and provide a better stump than could be expected if the bones were allowed to separate without any covering being provided for them. (Fig. 2.) On the whole, it seems best to steer a middle course, and to avoid interference until the soft parts are nearly detached, (Fig. 3,) when they may be easily dissected a little upward, so as to expose the bone, and allow it to be divided with a saw, or disarticulated sufficiently high to let the integuments meet over, and afford the necessary protection to its extremity.

Fig. 2.



It is a curious and not less important fact, that when the cause is of a local nature and limited extent, the effect is not always confined to the

Fig. 3.



part concerned. Thus, though the mortification caused by the wheel of a wagon passing over a limb is often confined to the bruised textures at the seat of the injury, on other occasions of a similar kind, the destructive process rapidly diffuses itself, and proves fatal, unless checked by timely amputation. A fine healthy boy of fourteen, the son of a farmer near Edinburgh, suffered a simple fracture of his fore-arm. An attentive and experienced practitioner applied a bandage, but residing at some distance, was not aware of the swelling that subsequently took place, and on visiting his patient, found the limb black and cold. I was then sent for to amputate the arm, which had become swollen up to the shoulder, pitted on pressure, and displayed a dusky red color. Though the case seemed nearly hopeless, I performed the operation at the joint. The patient did not rally, and died on the third day after. In the compound fractures again, it frequently happens that the mortification is not of limited extent, but preceded by a quickly spreading gangrenous inflammation, engages the whole limb, and proves fatal before the end of many hours. The discrimination between those cases of external injury in which the mortification is to remain local, and those in which it is to extend, requires no less experience than judgment; and it appears not improbable that some at least of the cases, in which amputation has been reported as successful on account of spreading gangrene, were not really of the formidable nature supposed.

TREATMENT OF GANGRENA SENILIS.

This "nasty, painful, lingering, and destructive disorder," to use the words of Mr. Pott, has been generally regarded as one of the opprobria of surgery, and the subject of palliative rather than remedial treatment. Under the system of management usually pursued, it certainly leads, with few exceptions, to a fatal termination. But there seems reason to hope that, by proceeding on a different principle of practice, the result may be rendered less unsatisfactory, and more creditable to the healing art.

"The whole plan of the chirurgic treatment of this disease," says Mr. Pott, "is founded on a general idea of warming, invigorating, stimulating, and resisting putrefaction." And it is very remarkable, that while his essay on the subject attracted so much notice as to connect his name with this kind of mortification ever since the time he wrote, the practice generally employed still continues the same as he has described it, notwithstanding his statement, that "whatever heats, irritates, stimulates, or gives uneasiness, appears to me always to increase the disorder, and to add to the rapidity of its progress; and, on the contrary, I have always found, that whatever tended merely to calm, to appease, and to relax, at least retarded the mischief, if it did no more." He accordingly recommends a simple poultice as the best local application, and the free use of opium internally.

Although the local soothing plan advocated by Mr. Pott alleviates the patient's sufferings, and delays the progress of the disease, it never, in any instance that has fallen within my observation, proved sufficient to arrest completely the morbid action. In order to attain this more important object, it is necessary to lower the tendency to excitement throughout the system, by enforcing a strictly vegetable diet, abstinence from every sort of stimulant, and the maintenance of perfect quiet in the horizontal posture. I am aware that the proposal of this starving plan may appear rather startling, and unsuitable for the old and debilitated persons who are chiefly subject to the complaint; and it sometimes requires considerable firmness to get the requisite measures carried into effect, when opposed by professional as well as vulgar prejudices. But the admitted hopelessness of the case, under ordinary treatment, should encourage the trial of other means, especially such as have stood the test of experience. Hospital practice does not frequently afford examples of this disease, to the production of which redundant nourishment, though not essential, seems powerfully predisposing; hence it is met with much more often in persons of easy circumstances than in poor people, who are able to obtain merely the necessaries of existence. The following instance occurred in the clinical course of last winter, and having been treated beyond the reach of any interference calculated to occasion uncertainty, will be more satisfactory to the reader than others observed in private.

Helen Byres, a very thin and weak old woman, stating her age to be fifty-seven, but apparently much more advanced in years, was admitted into the hospital on the 28th of January. She complained of severe pain in her left foot, especially in the little and great toes. The instep was red and somewhat swelled, and extremely tender to pressure. The little toe was quite black, and the great one of a dark-purplish color. The former had become painful between two and three weeks before, in consequence, as was alleged, of exposure to

cold, together with wearing a tight shoe. After eight days of continued and increasing pain, discoloration was first noticed; and it was only a few days previous to admission that she had been suddenly seized with violent pain in the ball of the great toe.

Circumstances prevented my attention from being directed to this case until the end of a week, during which period nourishing food, with wine, had been prescribed, in accordance with ordinary practice, and the extremely debilitated appearance of the patient. Under this treatment, the pain, redness and swelling of the foot had increased, while the dark discoloration of the toes had extended. Having ascertained the nature of the complaint, I did not hesitate to order a strictly farinaceous diet, water for drink, and a simple poultice for the foot. The symptoms then gradually abated, and the patient, instead of sinking under the united effect of disease and weakness as she had previously threatened to do, acquired additional strength, and greatly improved in her appearance. In the beginning of March, the little toe separated at its metatarsal joint, and about three months afterward the great toe did the same. The sores healed kindly, and presented on each side of the foot a no less seemly cicatrix than if a skillful amputation had been performed. The starving plan was then abandoned; and the poor old woman, after subsisting on bread and water for upward of four months, was allowed the usual diet of the hospital.

In illustration of the treatment which it is my present object to recommend, may be mentioned a case by no means rare in private practice. The patient is usually a man in easy circumstances, somewhat addicted to the pleasures of the table, and beyond sixty years of age. Without any warning, he observes a pimple on his leg. It opens, and leaves a small sore, which, instead of healing, becomes covered with a slough, generally of a black color, but sometimes white. The surrounding skin now inflames to a small extent; pain gradually increases, and is felt most severely at night, so that sleep is disturbed or prevented. The system then becomes seriously deranged, and the local affection still increasing, there is no limit to the morbid process except death itself.

The tendency to mortification in this form of disease, just as in that so well described by Mr. Pott, leads practitioners to the employment of invigorating measures. And I have uniformly observed, that whether the patient was stimulated by an additional allowance of food and wine, or was permitted merely to continue his ordinary diet, the sloughing action prevailed in opposition to every sort of soothing application that could be tried locally. But when the starving plan was adopted, and the patient restricted to vegetable articles of support, the redness has quickly disappeared, the pain has gradually decreased, and the sloughs, ceasing to extend, have been detached from a sub-

jacent healing surface of granulation, which before long formed a sound cicatrix. The only means employed on such occasions, in addition to the vegetable regimen, have been linseed poultices, and the muriate of morphia given freely, either solid or in solution, so long as the nocturnal pains continued. It may be added, that no inconvenience has ever been sustained, to my knowledge, either from adopting the spare system, or resuming the ordinary one, even when the age of the patient was beyond eighty years.

Professional opinion is still unsettled as to the cause of mortification in the extremities of old people. Ossification and obstruction of the arteries are frequently met with on dissection, but not always; while, on the other hand, the former of these conditions is infinitely more common than the effect in question. All we know with certainty, seems to be—*first*, that there is a combination of weakness and overaction in the affected part; *second*, that the weakness cannot be remedied either by local applications, or internal remedies; *third*, that the means employed with this view powerfully excite the tendency to overaction; and *fourth*, that the best mode of treatment consists in the employment of soothing measures, local as well as general, until the part regains its usual condition—just as when a portion of the body has been weakened by exposure to cold, or by the ligature of its principal artery.

The opportunities of further observation presented to me since the paper, here reprinted, was published, have tended to confirm the views it communicated to the profession. Difficulty has occasionally been experienced in overcoming the prejudices of practitioners, as well as patients and their friends, sufficiently for a fair trial of the system proposed. But the advantage almost immediately derived from abandoning the use of nutritive food, with its stimulating accompaniments of wine and spirits, is so obvious, that this plan of treatment has required only a commencement to insure its continuance. Attention to the subject has now been fully awakened, with the effect of generally introducing a salutary change in the management of Gangrena Senilis, although it appears that the highest surgical authority in the southern metropolis, is still in favor of nourishment and stimulation.

"In the management of these cases (*Gangrena Senilis*), there can be no doubt that one principal object to be kept in view is the maintenance of a sufficient supply of blood in the system. As the abstraction of blood is mischievous, so the opposite treatment is likely to be beneficial. Let the patient, then, be put on a system of nutritious diet, not overloading his stomach, so as to produce a red and yellow sediment in the urine, but taking as much food as can be easily assimilated, and no more. Let him live chiefly, but not entirely, on animal

food, which makes blood—if I may use the expression—of a better or stronger quality than that derived from vegetables alone. In addition to this, administer some such stimulants as ale, wine, or brandy. You will generally find that persons who have mortification of the toes have been accustomed to take a good deal of fermented or spirituous liquor, and, being accustomed to it, that they cannot do without it. Nor is this all. Those whose mode of life has been different will require the exhibition of stimulants under these circumstances. The question, however, will arise in each individual case, What is the proper quantity to be exhibited? Some persons may want a bottle of the stronger wines daily; but very few, on this, or on other occasions, are benefited by so large an allowance as this. In the majority of cases, from the third of a pint to a pint daily, will be sufficient. You should ascertain what have been your patient's previous habits, and then give him stimulants cautiously, observing the effect produced. There is one good rule of conduct in this respect, both in health and in disease; any quantity of wine that does not occasion heat of skin, nor raise the pulse, nor make the mouth clammy, nor render the patient nervous or irritable, may be given with advantage; but whatever does more than this does mischief."*

The plan I advocate must not be confounded with that, chiefly supported by French pathologists, which consists in treating the disease as of an inflammatory nature by scarification, leeching, venesection, and other measures, that belong to the antiphlogistic system. This differs no less from the method which it is my object to recommend, than from the treatment of stimulation—since, if the limb concerned be suffering from *weakness*, combined with a tendency to *overaction*, it seems not more improper to cause or increase excitement by the administration of stimulants, than it would be to reduce the strength which exists by general or local depletion. Regarding the morbid derangement as essentially depending upon a combination of the conditions just mentioned, I should consider both these modes of treatment as equally objectionable, and, in their stead, would simply endeavor to protect the part affected from excitement, as well as depression, until the overacting disposition can be allayed. The former of these objects, I believe, may be best attained by enveloping the part with a poultice, or a thick covering of cotton or wool; and the latter, by placing the patient in the horizontal position, with injunctions to maintain a strictly farinaceous and milk diet. The solution of muriate of morphia should also be given in doses of thirty drops, from two to four times a day, or more freely, if this should be found necessary for the relief of pain. But, in the absence of pain, a moderate quantity of

* Sir Benjamin Brodie. Lectures, 1846, p. 367.

this soothing agent should still be prescribed, as it unquestionably excites a powerful and most beneficial influence in restoring the healthy action.

[The divisions and theories of mortification by different writers, are exceedingly numerous, and often very contradictory. Between the treatment proposed by Mr. Syme and other allopathic authors there is a wide difference. Without, at present, entering into a consideration of these, I beg to refer to the character of some of the agents used and recommended by Mr. Syme in the treatment of mortification. Mr. Syme tells us that, if the system has become weakened by any cause, such as improper diet, etc., we must sustain its energies "by the administration of wine, spirits, and other stimuli of speedy operation." I have already shown that to keep up the vitality of the system—the life-force—is a paramount duty. If the system be greatly weakened, of course, wines for immediate action may be employed; but I contend that to depend upon stimulants to sustain the vital powers, or so increase them as to enable the system to bear up against the effect of mortification, is highly unphilosophical. It will be borne in mind that stimulants are excitants, whose influences in the system are only of short duration, and further, that sedation results from the reaction of excitation. On the other hand, tonics are really only permanent excitants, whose action, while more durable, is less rapid than that of excitants. Tonics are agents which tone up the system, and indirectly give strength to muscular fiber. The excitation which they get up in the system is very gentle, and the reaction is scarcely perceptible. When excitants are withdrawn from a system under their influence, depression and prostration rapidly supervene. The reaction of excitation is debility, and the reaction of debilitants is excitation. Tonics occupy a medium position between these. The primary action of tonics, which is gentle, has the advantage of a permanency sufficient to confer increased vital energy to the nervous system, the result of which is a strengthening of the muscular fiber. As before stated, we have no known agent which has a special affinity for muscular fiber. Tonics, for convenience, have been divided into direct and indirect tonics. They belong mostly to the latter class, and give tone to the system by inducing an influx of nervous energy. They act, then, primarily on the nerves, and increase the strength of the muscle by augmenting fibrous contractility. When thus viewed, we must regard as tonics all agents which improve the general health. We have good examples of the effects of augmented nervous energy over the muscles, in the opposite states of nostalgia and insanity. Under the gentle excitation of tonics, all the capillaries are slightly augmented in their action, nutrition is improved, and a sufficiency of nervous energy is induced to insuer a healthy condition of the system. All tonics

are obscurely stimulant. Many tonics first enter the circulation, and by changing the character of the circulating medium tone up the system. From the very name of tonics, we cannot expect to derive immediate benefit from their use. The first effects we observe are, increased appetite, augmented nervous impressibility, increased velocity and power of the circulating fluid, buoyancy of intellect, and increase of muscular power. Unlike other agents, they may be safely administered in all cases, and for this reason physicians often use them. We should be careful in administering crude vegetable tonics, not to incumber the stomach with useless indigestible matter, for we may thus induce serious irritation. It is for this reason that the concentrated vegetable tonics are so much prized by practitioners. There are simple tonics, nearly tasteless, bitter tonics, astringent tonics, excitant tonics, etc.; and of course, every physician will use that combination best suited to the case he has in hand. This is by far the most extensive class of agents we possess.

Of this class of agents we have very many which can be recommended with confidence, *e. g.*, the Xanthoxylin, Hydrastin, Cornin, Rhusin, Euonymin, Quinine, Viburin, etc. As an excitant tonic, we possess nothing superior to the Xanthoxylin, especially when combined with Quinine, Cypripedin, and Hydrastin. It is very often the case that we have local weakness, and in such cases it will be necessary to inquire first, whether there is a due circulation (and almost invariably it will be found that there is not); and secondly, upon what the impediment depends—the object will commonly be to effect a general distribution of the circulation. Tonics and revulsives will accomplish this. The diet, in every case, must depend upon the amount of vital force needed in the system, after it is determined that there are no obstructions to the circulation, and no accumulations of the vital force which would deceive us in making up our estimate of the patient's strength. Bleeding, purging, the administration of such nauseants as the tartrate of antimony, will never, if closely persisted in, relieve a patient laboring under inflammation. Authors recommend this practice, their students follow it, afterward edit the works of their teachers, and acknowledge that the plan fails; still they recommend it—they do not think, for a moment, whether the plan, notwithstanding its acknowledged inadequacy, cannot be substituted by one more sanitary. The elm bark (ulmus fulva) will be found greatly superior to the linseed-meal recommended by Mr. Syme. In the cases which I shall introduce, the immediate practice of Eclectic surgeons will be more apparent.

I am of the opinion, that as far as a constitutional treatment is indicated, it will be important to consider the nature of the complaint, and prescribe accordingly: but in reference to the local application, I think that one single remedy is sufficient to fulfill every indication and that

more dependence may be placed upon it, than upon any constitutional treatment, and there is no doubt but that the profession will willingly hail this discovery as one of importance. My practice in this malady has led me to step out of the old beaten track, in search of some agent that can be relied upon for its efficacy, its general application with safety in all cases, with but little modification, and one that will remove the necessity of so much attention to constitutional remedies, in many cases entirely.

This agent may also be used in the treatment of some varieties of erysipelas, which will be referred to hereafter. Sulphate of zinc is the article to which I wish to draw the attention of practitioners, as a remedy for mortification, and to show its beneficial results, by the description of a few cases treated by it. It may be argued, that the use of any remedy that will of itself produce active inflammation, could not be applied to a highly inflamed part, without producing fatal consequences, by increasing the disease beyond the reach of remedies. This will, doubtless, appear true to many, but experience has proved the contrary, for it has been used in cases where the parts were in the highest state of inflammation, and although this was increased for a few hours by its action, yet in no case have I found it to produce any bad effect, or to so augment this condition, as to present any difficulty in the subsequent treatment. It will be remembered that all cases of mortification are attended with a very offensive fetor, which is one of the characteristic symptoms of this disease, and which is caused by a decomposition of the healthy structure of the parts attacked, and this very cause produces the continuance of the disease, the changing of which is the indication to be fulfilled in every variety of treatment that has been adopted.

No agent will act so immediately in producing this change as the sulphate of zinc; the most extensively mortified surface, with the offensive fetor arising from it, can be stopped in a few hours after its application, and after one or two applications, the parts become hardened, and the fetor entirely removed. It fulfills two indications in this respect, viz: arresting the decomposition going on in the parts, and correcting all unpleasant fetor which may exist; and it should be borne in mind, that as long as this fetor is present, the disease is not arrested. The following cases will be illustrative of the method of using it, in which I have found it useful.

Case I.—Mr. F., aged twenty-five, residing in Fulton, came to consult me in December, 1846, with an extensive mortification of the whole palatine arch and gums of the superior maxillary, succeeding a mercurial action which had been produced and continued a long time, and which had resisted the usual treatment for its arrest. I was induced to try the sulphate of zinc, and mixed a small quantity of it in fine powder,

with a sufficient quantity of flour and water to make a paste; this I spread upon soft leather, and applied over the parts affected, retaining it there until the paste sufficiently adhered, by a sponge placed upon the tongue. I would here remark, that this was a well-marked case. The fetor arising from the mouth was such, that one could scarcely stay in the room with him.

On the succeeded day, I found the fetor much diminished, and the parts secreting but little, with a portion entirely hardened. I made a second application, in a similar manner, and on the next morning the unpleasant fetor was entirely removed, and the whole of the diseased parts covered with a dry, hard surface, and no vestige of secretion from any part of it. I considered this to have been carried far enough, and made no further application of the zinc, but recommended the mucilage of ulmus and warm water, to be used freely in the mouth, which was pursued for three days, when the entire portion upon which the zinc had been used, sloughed off, leaving a healthy appearance of the parts. It may be well to state here, that the entire structure of the arch, with a large portion of the bone, came away, after which it was treated as a common ulcer, and healed in about ten days, since which time he has remained in good health.

Case II.—Mrs. S. was under treatment for a cancerous condition of the breast. It had ulcerated, and was attended with all the unpleasant symptoms of such a condition. I made use of caustic applications for its removal, but found upon the second day, that the whole gland was in a state of mortification, and that the system was fast failing from its effects. I immediately applied the zinc, in the form of powder, covering the affected parts with it; in less than six hours a change of the fetid smell was very perceptible, but the inflammation continued without any abatement during twenty-four hours. On the next day, I found that the remedy had dried, and hardened a portion of the diseased surface; I, therefore, again applied it, and covered the medicine with a poultice of elm bark, mixed with cold water; this dissolved the zinc in a few hours, and had the desired effect of changing and arresting any further extension of the mortification. In this case, two applications were sufficient. It will be found that in some cases, the zinc will produce a hardened surface, so as to prevent a sufficient quantity from acting throughout the diseased parts; this can be remedied by applying an elm poultice after the zinc is used, which will soften the surface enough to allow its full action, which is known, as before said, by absence of the fetor. All the dressing that is required, is the elm poultice, both before and after the use of the zinc; if the first application increases the inflammation to any extent, apply the elm for ten or fifteen hours, after which apply the zinc. The part will usually slough off in three or four days.

Case III.—J. F., aged forty-eight, had an encephaloid tumor, situated on the leg, which required to be removed by an operation, previous to the application of medicine for its permanent cure. It was removed without any unnatural appearances attending the case. But on the second day, the whole incision, and for three inches around, became gangrenous and accompanied with a high degree of inflammation. I immediately applied the zinc, and continued it for three days, when it was completely arrested, and in three days longer the diseased parts sloughed off, leaving a healthy condition of the remaining integuments, which were then treated without any further difficulty.

I have made use of this agent in eighty-six cases, and in each it proved highly successful, so much so, that in only five cases was a slight constitutional treatment demanded. As these cases are all similar to those given, I deem it unnecessary to particularize any further.

In seven cases of ulcerated erysipelatous inflammation, I have used the zinc with similar success, though in these instances, it required a smaller quantity of the article, a greater number of applications, and at greater intervals between the applications. At some future time, I may again refer to this article, and its effects in other forms of disease.—R. S. N.]

CHAPTER III.

EFFUSION.

EFFUSION OF SERUM.

The action or process which is denoted by the expression Effusion, consists in the separation of the serous or fibrinous portion of the blood, and its discharge into some part of the body.

Effusion is not necessarily preceded by inflammation, but is very frequently a consequence of it. It has already been remarked, that a slight degree of effusion almost always attends inflammation.

Serous effusion takes place chiefly into the interstices of the subcutaneous cellular texture, and into the cavities which are lined with serous membranes, as the *pleura* or *peritoneum*, and the joints. In the former situation, it occasions a swelling of the part affected, which is smooth, colorless, unless inflammation exists, and pits on pressure. This is Œdema or Anasarca. It occupies those parts which are most

dependent, especially the inferior extremities and the scrotum, and changes its place with the position of the body. In the serous sacs it constitutes collections of fluid, which are named Dropsies.

The fluid, both of œdema and dropsy, generally bears a close resemblance to, or rather seems identical with, the serum of the blood. Sometimes it is more limpid and colorless, tinged with blood or bile, more watery, or loaded with a larger proportion of albumen.

Serous effusion is induced in the cellular texture and serous sacs by various circumstances. It is often observed distinctly as a consequence of inflammation, but in this case the serous sacs are chiefly concerned. It very frequently results from the venous circulation being impeded either by the mere posture of the body or obstruction of the vessels, or from disease of the heart or liver, or the presence of a tumor compressing the veins, of which pregnancy frequently affords an example in causing œdema of the limbs. It also by no means rarely occurs without either any previous excitement of the part, or obstruction of the venous circulation that can be observed, and seems to depend on weakness alone. This may happen in both situations, but most frequently occurs in the subcutaneous cellular texture of the inferior extremities, as may be seen in the course of most chronic diseases which terminate fatally.

The means of preventing serous effusion are, of course, to obviate as far as possible the circumstances which occasion it. Inflammation should be treated on the principles which have been explained to make it terminate in resolution. If the circulation of the veins is not free, the impeding cause ought to be removed. If weakness threatens to occasion the effusion, it must be remedied by means suited to the case, and especially by the use of bandages, together with the horizontal posture.

The cure of effusion is sometimes accomplished by simply puncturing the skin, or sac containing the fluid, and allowing it to flow out. But very generally the vessels, from which the effusion has proceeded, continue their action, so as to renew and maintain it after such evacuation. It is therefore necessary to change the action of the vessels, and this is done by various means. Mere external pressure sometimes suffices, and is more powerful when preceded by the application of blisters or stimulating ointments and lotions, particularly those containing mercury and iodine, to the neighboring skin. When signs of excited action continue along with the effusion, general and local bleeding may be proper, together with applications of a soothing nature; and on the principle of counter-irritation or metastasis, diuretics, diaphoretics, and purgatives are administered. It is generally observed that the effused fluid is more readily absorbed when it is seated in the cellular substance, than when it occupies a serous bag, provided the exciting cause has

been removed. When the dropsical effusion is of small extent and superficially situated, particular operations are occasionally performed for its radical cure, as will be explained hereafter under the titles of Bursæ Mucosæ, and Hydrocele.

[The mercury and iodine here recommended may be substituted by podophyllin, leptandrin and sanguinarin in combination, and by phytolacin, gelsemin and salicin.—R. S. N.]

EFFUSION OF FIBRIN.

When fibrin is effused, it presents the appearance of the buffy coat, and is named Coagulable Lymph. This effusion happens most frequently in the same situations as the serous one, but also occurs on the mucous surfaces, and in the interstices of every tissue.

When the lymph is thrown out upon a surface, it takes the form of a crust or membrane—and if not disturbed, is apt to become organized and vascular, so as to constitute a permanent structure. Adhesions are thus often effected between adjacent surfaces, as those of the pleura. When lymph is effused on a serous surface, there is generally more or less serum also, which, in this case, is not limpid and colorless, but turbid, with flakes of lymph floating in it. If the patient survives so as to afford sufficient time for the purpose, the lymph, where adherent to the sides of the cavity, is organized into dense membranous structures, and the serum acquires the usual appearance of a dropsical fluid. The loose portions of lymph sometimes become indurated into masses of a tough consistence and yellow color, which usually resemble each other in size and form, as may be seen not unfrequently in bursæ that have suffered from inflammation.

Effusion of lymph on a natural surface occurs almost always as a consequence of inflammation. It is also occasionally produced by two surfaces of the same kind being pressed together, as may be seen in the bloodvessels, particularly the veins, or in the contents of a large hernia for which an imperfectly fitting truss has been worn. The means of prevention consist in subduing the inflammation that precedes; and it may farther be stated, that the constitutional disturbance produced by mercury seems much opposed to the action which occasions the effusion, whence the use of that medicine, in cases where injurious effects are threatened from this source, as in Iritis.

[I cannot agree with Mr. Syme, in the declaration that the condition induced by mercurials is to be sought to prevent the effusion of fibrin. Even if so, mercury is itself a foreign and irritating substance in the system, productive of more evil than good.—R. S. N.]

Lymph, like serum, is effused into the cellular interstices also, but in this case is not confined to the subcutaneous texture, and occurs with equal readiness in the constituent, as in the connecting cellular

substance of organs. In this situation, if time be afforded, it always becomes organized, so as to cause thickening and hardening of the part concerned.

This effusion may occur as a consequence of inflammation, but much more frequently takes its rise from the immediate effect of local irritation, such as that produced by the passage of fluids through preternatural channels, or by the lodgment of foreign matters within the substance of the body, as when the urine escapes by a *fistula in perinæo*, or a bullet lies where it cannot be extracted. The result in these cases is thickening of the surrounding parts, or the formation of a capsule. This process is generally rather beneficial than injurious, as it limits the influence of the irritation, and prevents it from exciting a more violent or injurious action. Its effects generally disappear as soon as the cause that led to them is removed; if they do not, the same means which promote the dispersion of œdema are required, namely, pressure, with blistering, and stimulating ointments.

Lymph is also effused on the surfaces of wounds, and sometimes unites them, so as to remedy at once the solution of continuity. This process is named Union by the first Intention. The steps by which it is accomplished, and the circumstances that oppose and favor its completion, are extremely important.

Every wound is attended with more or less bleeding; and as it gradually ceases, an exudation of serum takes place, which is readily recognized by the faint-colored stain it makes on the dressings. From eight to twelve hours after the wound is inflicted, less or more, according to its extent, all this discharge ceases, when lymph is effused from the cut surfaces, and if they are in contact, or nearly so, glues them together—becoming gradually organized, and completing the union from forty-eight to seventy-two hours after the injury has been sustained. The union, though now perfect, so far as regards appearance and feeling, does not possess much mechanical strength; and if the lips of the wound be torn asunder, they are found to have a coating of coagulable lymph on each of the respective surfaces, precisely similar to that which is effused upon serous membranes as a consequence of inflammation. Inflammation, therefore, used to be considered essential to this mode of union, which was said to be effected by Adhesive Inflammation. It is now ascertained that inflammation, so far from being essential to the process, is subversive of it. A certain degree of excitement is not incompatible; but whenever it goes so far as to occasion pain, or much swelling and redness, union by the first intention is frustrated: and the way is led to another process of reparation hereafter to be described, viz: Granulation.

Inflammation being thus preventive of primary union, and the inter-

position of any foreign substance, or the separation of the cut surfaces, beyond the extent to which they can be glued together by the thin layer of lymph effused from each, being of course no less adverse to the process, it follows that the plan which used to be followed in dressing wounds should be regarded as equally injudicious and injurious. It consisted in closing them immediately, or soon after their infliction and retaining their lips in accurate contact by adhesive plasters, or other means, pledgets of ointment and bandages being applied — and no change made in dressing till the fourth day. The consequences were, that the blood and serum being confined, the edges of the wound were separated from each other; and the stimulus of necessity, as John Hunter called it, or irritation produced by the continuance of a breach in the structure of the body, which, if primary union had occurred, would have ceased to exist, caused inflammation as the first step to the other mode of reparation already mentioned. Two insuperable obstacles, either of which would have been sufficient for the purpose, were thus placed in the way of direct adhesion, viz: separation of the raw surfaces, and inflammatory action; and when the wound was at length undressed, instead of being united, it was found distended into a cavity filled with matter.

It is much more consonant with reason, and will be found much more successful in practice, to close the lips of the wound only partially or not at all, for ten or twelve hours, until the bloody and serous oozing shall have ceased, and then to place them in the most exact possible contact, at the same time taking care to prevent or allay excited action by cold applications and suitable regimen.

It is plain, that in the first instance no attempt should be made to close the orifice completely — that pressure should be directed to the bottom rather than the outlet of the wound — that blood should not be allowed to crust over the lips; for though blood may be the best, that is, the least hurtful balsam, I have often known it confine the serous discharges, and so prevent union — and that the orifice should be wiped and kept dry as long as it exudes any moisture.

For attaining these objects, I would recommend, in the first place, that when means are required for keeping the cut edges in contact, stitches should be preferred to adhesive plaster, since their effect is exerted at considerable depth, while they offer little or no resistance to the exit of fluid. Some surgeons employ stitches and plasters together, but this plan is objectionable; for plasters, acting only on the surface, always tend to close the lips, or even turn them inward, while they not only effect no deep pressure, but even render the parts concerned more loose and disposed for the formation of sinuses; and stitches, if put in close enough, may always be rendered equivalent to the effect required. It may be noticed, however, that a little gaping of the edges is by no

means hurtful in the first instance, since it ensures a thorough discharge, and may be rectified as soon as adhesion begins.

Secondly, I would advise the disuse of all long, complicated bandages, which cannot be tightened or slackened in part, and removed without disturbing the patient.

Compresses having been laid along the sides of the wound, it will be easy to effect pressure by very simple means, independently of long circular rollers. For instance, in wounds of the trunk, nothing can be more convenient than a broad piece of linen, long enough to cross a little over the breast, and having its two ends torn longitudinally into three or four portions, any one of which may be tightened or slackened as occasion requires, while the whole may be thrown back at a moment's notice.

For wounds of the extremities, a similar bandage, on a smaller scale, will answer equally well; and as for stumps, I beg to recommend a very simple contrivance, that has often saved me much trouble. A roller is put on as usual, from above downward, until it has come within a few inches of the stump; and then a few narrow strips of cloth being pinned or otherwise attached on each side, nothing remains to be done but tying them to each other across the face of the stump.

Lastly, I would advise that the surgeon should apply dry lint over the wound, as often as the least moisture is perceived.

The great essentials for primary union appearing to be approximation of the raw surfaces sufficiently near to place them within reach of the adhesive action, and prevention of their displacement by the accumulation of fluid between them, the different circumstances of wounds afford room for varying the modes of their management. In those penetrating the mouth, through the cheek or lips, the cavities of the trunk, or the joints, the raw surfaces may be at once accurately brought together at their external edges by the interrupted or twisted suture, without any risk of subsequent separation by fluid effused between them, since there is space for its reception at the inner side of the wound. But in wounds opening upon only one surface, and more especially those of considerable depth, or situated in parts opposed to accurate coaptation, the dressing should be applied with a view rather to compress the sides of the cavity than to close its orifice. Stitches may be employed to assist in regulating the position of the cut edges, but not so as to confine them in close contact; and compresses of dry lint, or other bibulous material, must be carefully employed to retain the raw surfaces in due position, without impeding the discharge of blood or serum. One or more soft and moist, and carefully squeezed sponges, I find extremely convenient for this purpose, especially in regions of the body where the textures, entering into the formation of

the parts concerned, are such as to impede the efficient action of pressure. After removing tumors from the upper or lower triangle of the neck, in the neighborhood of the parotid gland or clavicle, I have, by this means, obtained union by the first intention, when it could hardly have been expected. In amputations at the ankle joint, I have, in like manner, experienced great advantage from a hollow sponge, sufficiently large to receive and contain the stump.

CHAPTER IV.

ULCERATION—ABSORPTION.

By Absorption is understood an excess in the action of removal over that of deposition in the nutrient vessels. The effect of this is necessarily a diminution in the bulk of the part concerned, which may be either of the surface or the substance. Absorption, therefore, is distinguished into superficial or ulcerative, and interstitial.

It may occur in both situations as a consequence of inflammation merely, without reference to the exciting cause; but much more frequently it depends upon some peculiarity of local irritation, which either occasions it directly, or indirectly through the intervention of inflammation.

The most common exciting causes of absorption are pressure, and the presence of something not naturally existing in the body. It frequently removes fluids effused into the interstices and cavities, and when inadequate to effect this, generally opens a passage for their escape externally, by removing the parietes containing them to such extent as is necessary for effecting an aperture. Foreign bodies which excite more irritation than what is sufficient for causing the effusion and organization of lymph around them, very frequently obtain their discharge by a similar process of interstitial absorption. It is important to notice, that, though the pressure or irritation excited by the foreign matter, one would suppose must be equal on all sides — the absorbing action always takes place in the direction of the nearest external surface, unless an internal one lined with mucous membrane, should be very near, when the process proceeds toward it. It is by ulcerative absorption of the surrounding living tissues that sloughs are detached.

[Without entering into a minute inquiry respecting the nature of the causes of ulceration, which I conceive to be unnecessary in this work,

I shall consider a few points of interest not mentioned by Mr. Syme. It may be remarked that there are three distinct stages of ulceration, no matter how it may be induced. These may be termed the sloughing period, the period of plastic deposit, and the period of granulation and cicatrization. Whenever the ulceration is progressing, there will be observed a circle around the ulcer which is characterized by redness, heat and a peculiar pain; hence, it is said, that under such circumstances the ulcer is surrounded by a circle of inflammation. The edges of this circle are very uneven, and the surface is more or less rounded and covered with a yellowish tenacious slough. There may be a sort of a poor pussy discharge, or there may be none at all. This is all observed during the sloughing period. In the period of plastic deposit, the inflammation is much reduced, and there is deposited a thin layer of plastic matter in the tissues of the base and sides of the ulcer. This deposit constitutes the medium through which the work of repair is finally accomplished by the third or granulating period. The granulations now fill up the cavity caused by the ulceration, and the ulcer soon cicatrizes. The means to be used for inducing ulceration, or, as it is sometimes termed, absorption, are stimulating lotions, excitant ointments, etc. I consider these all-sufficient.—R. S. N.]

CHAPTER V.

GRANULATION.

EFFECTS OF THE GRANULATING ACTION.

The term Granulation is applied to an action, which repairs breaches in the continuity of the surface that are not healed by primary union. Such breaches may be caused by violence or absorption, and in both cases are named Ulcers. An ulcer may be defined to be a solution of continuity in a natural surface, secreting matter.

When a wound does not heal by the first intention, it begins about twenty-four hours after the injury has been sustained to be painful, and attended with the other symptoms of inflammation. A thin serous discharge oozes out from it, and by-and-by the surface acquires a uniform appearance, whatever be the tissues which compose it, owing to an effusion of lymph that seals up the interstices of the cellular substance, and forms a thin superficial covering. About the third day, sooner or later, according to the activity of action, the incrustation of

lymph becomes organized — it acquires a red color, bleeds when touched, and before many days have elapsed, shoots up into small granular projections, whence the process is named. These granulations are small, pointed, firm and vascular — they are covered with a fine pellicle, and secrete a peculiar thick straw-colored fluid, named Pus, the properties of which will be more particularly described hereafter.

The wound is now, properly speaking, an ulcer, and the subsequent process of healing is the same as in ulcers caused by absorption. The inequality of surface, if any existed, gradually disappears, the bottom of the ulcer becomes regularly concave, and at length there ceases to be any difference of level between it and the surrounding parts. While these changes are taking place, the extent of the breach is daily diminishing, by a general contraction of the surface. Then a fine blue pellicle is observed at the edge, which increases in breadth, and at last covers the small remnant of the ulcer that is not closed by the contraction just mentioned. This new-formed skin is named the Cicatrix; it is, of course, always much smaller in extent than the original breach of continuity, and diminishes still further in the course of time. At first it is blue or purple, and very vascular, but afterward it ceases to be so, and becomes dense, white, and bloodless, at the same time contracting still farther.

NATURE OF THE GRANULATING ACTION.

It is generally believed that the granulations grow up above each other by the effusion and organization of lymph in successive layers, until the cavity is filled to the proper level. That then the thin pellicle on the surface begins to be thickened and formed into skin at the circumference of the ulcer, while the granulations below shrink, owing to absorption of their constituent substance, and draw the edges of the breach together.* There can be no doubt, however, that this opinion rests on inaccurate observation, and is quite incorrect. The subject was carefully investigated by the French Academy of Surgery; and the essays of Louis, Fabre, Pibrac, etc.,† leave hardly any thing to be desired for its elucidation. They showed that there is never any real reproduction of lost parts, with the exception of bone, which in some circumstances is regenerated. The skin also ought perhaps to be excepted; but the difference as to appearance and properties between the substance that constitutes a cicatrix, and the ordinary integument of the body, would rather lead us to regard this structure as a new formation. In all other cases it will be invariably found, that when the cure is completed there either remains a depression corresponding to

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* Sir A. Cooper's Lectures, by Tyrrel, Vol. i, p. 160.

† Mem. de l'Academie de Chirurgie, T. iv and v, 4to. ed.

the loss of substance, or such a contraction of the neighboring parts as compensates for the want.

The first step in the healing of an ulcer seems to be subsidence of the surrounding swelling if any exists; and then a gradual emaciation, chiefly of the fatty, but also of the other tissues concerned, so as to render the skin more lax and easily drawn together. Hence it is that the cicatrix when first formed appears to be on a level with the neighboring surface, though there may have been a loss of substance to a considerable depth. After the cure is completed, the usual plumpness generally returns, and in such circumstances the cicatrix will always be found deeply depressed. Ulcers being thus healed by contraction, and not by any new production except what forms the cicatrix, the reason appears why their cure is accomplished more readily in parts which are lax, than in those which are comparatively fixed from adhering to the subjacent bones. The sore which remains after the removal of nearly the whole scrotum by sloughing or operation readily heals, with a very small cicatrix, while injuries of the scalp attended with loss of substance are repaired very slowly, and with a considerable depression at the part. The old stories of regeneration following removal of the lip for cancer, and destruction of the *glans penis* by sloughing, when inquired into and stript of their exaggerations, are found to admit of easy explanation. In the former case, it is apt to appear that the disease occupies a larger extent of the part affected than it really does, from the morbid growth taking the place of, and pressing aside the sound textures. Hence the whole lip may seem to be involved and taken away by operation, while, in fact, a comparatively small portion only has been removed, and the remainder is ready to stretch out when its surface is drawn together by the granulating action, and thus, in a great measure, supply the loss of substance. Something of a similar description occurs in sloughing of the tongue or *glans penis* — the swelling which attends the preceding inflammation making the part concerned appear much larger than it really is, so that, though the destruction is only partial, it may be thought complete. On all occasions, when a sore heals by the granulating process, there is great risk of supposing that the cavity is filling up, while, in truth, the bottom remains at the same level, and appears to rise from the surrounding skin descending toward it, just as the banks of a river seem to glide past the observer, who is carried smoothly on by the current. The best evidence as to this is afforded by sores seated over bones or other fixed points, between which and the surface of the granulations, the distance is not found to increase. In the old way of performing amputation, by cutting all the parts of the limb nearly on the same level, a large granulating surface resulted, which, if successive layers of organized structure were really formed by it, should grow out into a bulbous shape. But, instead of this, it is well

known that just the opposite condition obtains, and that the surrounding skin is drawn in a puckered form closely round the bone — as may be seen from any view of a stump, which has resulted from an amputation performed, on account of frost-bite, or for any other of the numerous causes of amputation. In fine, the healing of an ulcer should be regarded as an action, not of effusion or new formation, but of absorption or contraction; and it will be found, on considering the treatment of ulcers, that whatever causes swelling of the part concerned impedes, while everything productive of an opposite effect tends to hasten the progress of recovery.

When an ulcer is examined by dissection, the cellular substance lying under and around its base is found more or less infiltrated and condensed with lymph, but the granular covering is very thin, being limited to the crust effused in the first instance, and subsequently organized. The texture under the thin pellicle of the granulations is liable to be distended with blood or serum, which occasions a state similar to œdema, and elevates the surface of the ulcer so as to present the appearance which is commonly named *proud flesh*. Morbid nutrition may occur in the same situation, and then growths of various size, form, and appearance spring up; but these, so far from having any share in the process of cure, tend to delay or entirely prevent it. It may be asked, Why should not the natural structures be regenerated, if diseased ones are thus formed? But it should be recollected, that all we know of the laws of nature is learned from observation; and mere analogy, in opposition to well-ascertained facts, affords no reason to expect any reproduction of lost parts in the human subject. There are other circumstances under which regeneration takes place more readily—that is, when the parts concerned do not communicate with a breach in the surface of the body. An interstitial process then goes forward, consisting of the effusion and organization of lymph, which frequently forms a substitute, nearly or altogether similar to the original texture. The nerves, tendons, periosteum, bones and ligaments, are thus frequently restored, after suffering more or less extensive destruction.

TREATMENT OF ULCERS TENDING TO HEAL.

So long as the granulating process proceeds, as has been described, it requires no local treatment, except what is necessary to prevent it from being disturbed by external irritation. Great attention to cleanliness ought to be observed with regard to the parts surrounding the sore, which should be frequently washed, and shaved if there are any hairs upon them. There is no use or propriety in scrubbing the surface of the ulcer itself, as is frequently done, since the pus affords a natural covering to protect it, and would be sufficient for the purpose,

if it were not that the risk of injury from contact with external bodies, and the unseemliness of an ulcer exposed to view, require some artificial covering. Old linen, lint, or charpie, may be employed for this purpose; and, perhaps, the last-mentioned article is the best, as, being more porous, it allows the pus to pass readily through its interstices. Whatever be the covering employed, it should be either spread with some unctuous matter, at least where it lies upon the edges of the ulcer, to which it is otherwise apt to adhere, and consequently injure them when removed, or, what is better, moistened with water, and prevented from drying by a piece of oiled silk laid over it. The ulcer requires to be dressed frequently, in proportion to the quantity of discharge. Once in the twenty-four hours is generally sufficient, but twice is often necessary—and sometimes the interval may be extended to two days or more.

One granulating surface may unite with another, when they are placed in contact, and retained together. The cure is thus sometimes greatly abridged, and at other times very troublesome adhesions may result, as when the respective surfaces of the fingers are ulcerated from any cause.

TREATMENT OF CONTRACTIONS CAUSED BY CICATRIZATION.

When the ulcerated surface is extensive, and the integuments surrounding it are easily drawn together, as is the case after burns of the throat, great deformity and inconvenience are frequently occasioned by the contracting effect of the granulating action, rendering the cicatrix so small as to keep the parts about it permanently displaced and immovable. Mere division of the contraction is hardly ever sufficient to remedy the evil, as the firmness of the cicatrix prevents the edge of the cut from being separated much, and any relaxation thus gained is almost always lost during the subsequent cicatrization. An ingenious method of treatment was proposed by Mr. Earle,*—namely, to cut out the cicatrix entirely, and then unite the edges of the wound laterally, if possible, by the first intention, but, at all events, so as to prevent contraction in the longitudinal direction. In favorable circumstances for its performance, this operation answers extremely well, but these are unfortunately seldom met with, and it is obvious, that if the cicatrix be broad, or of much extent in proportion to the size of the part affected, no benefit could be derived from its excision. The most sanguine operator, for instance, would not attempt any interference with such a case as we sometimes see, where, in consequence of an extensive burn, the jaw is bound down to the sternum, the lips are depressed so as to cover the upper, and completely expose

* Med. Chirurg. Trans., Vol. v.

the lower teeth. It is an important fact, that the cicatrix, while still recent and vascular, may be extended by mechanical force, cautiously and perseveringly employed, since deformities from contraction may thus be not only prevented, but sometimes completely remedied. In the case of a girl, whose fore-arm, in consequence of a burn, was drawn up almost close to the arm, a complete cure was effected by one of my pupils in the course of a few weeks, through the use of an iron wire splint, fitted to the shape of the contracted limb, and gradually expanded.

TREATMENT OF ULCERS NOT TENDING TO HEAL.

Ulcers are prevented from healing by many different circumstances, which have led to a variety of complicated classifications for their arrangement. As the effect of these has generally been to perplex, instead of simplifying the subject, it seems better to adopt an easier system; and the three following heads will be found to comprehend the whole:

1. Ulcers which are prevented from healing by defect of action.
2. Ulcers which are prevented from healing by excess of action.
3. Ulcers which are prevented from healing by peculiarity of action.

The circumstance which has occasioned the ulcer, the part of the body in which it is situated, or the peculiarities of the patient's system, sometimes at once denote its nature; but in general this can be learned best by carefully examining the distinctive features that are presented, in respect, 1. To the surface of the ulcer, which may be level with the surrounding skin, depressed below it, or elevated above it, concave, smooth, or irregular; 2. The shape of its edges which may be regularly curved and smooth, or eroded and angular, round or sharp, undermined and inverted, or thick and everted; 3. The quantity or quality of its discharge, which may be purulent, bloody or serous, thick or thin, copious or scanty, fetid or inodorous; 4. The kind and degree of the pain proceeding from it; 5. The condition of the surrounding and subjacent parts, which may be hard or soft, inflamed or natural; and 6. The mode of its cicatrization, which may proceed from the circumference to the center, or from the center toward the circumference—on a level with the surrounding surface, elevated above, or depressed below it.

ULCERS PREVENTED FROM HEALING BY DEFECT OF ACTION.

The defect of action has been thought to depend sometimes upon a real want of power, and at others upon a want of disposition to exert the power that exists. The ulcers of this kind have accordingly been divided into Weak, and Indolent or Callous, which exhibit different characters, and require different treatment.

In Weak Ulcers the surface is generally higher than that of the surrounding skin, and exhibits large flabby granulations, which are either of a dark color, like that of venous blood, or pale and œdematous. The edge is smooth and flat or gently rounded; the discharge thin, watery, and generally profuse; the pain usually inconsiderable or altogether absent. The parts surrounding and subjacent, constituting what is called the stool or base of the ulcer, are soft and free from any indurating effusion. The cicatrix forms round the margin, and is at first generally elevated above the proper level, to which it usually descends afterward, owing to the contraction that takes places subsequently to its completion.

This kind of ulcer occurs in parts which possess weak powers of action, either on their own account or on that of the system. The general weakness is most frequently observed in children; but may be induced at any age, by deficient nourishment, an unwholesome atmosphere, etc. The local weakness may depend on obstruction of the blood, or nervous energy, the cause which occasioned the ulcer, or simply on the duration of the healing process. With regard to the second of these, it may be stated, that wherever the solution of continuity is effected by means which injure the parts concerned, as by lacerating, bruising, or burning them, it displays the characters of a weak ulcer; and, as to the last, it is sufficient to observe, that every ulcer tends to become defective in action during the process of cure; so that, if considerable in size, it is sure, sooner or later, to display the features indicative of this condition.

The treatment of weak ulcers consists in employing pressure, together with stimulating and astringent applications locally; and, if necessary, strengthening the system by the administration of wine, bark, bitters, and nourishing diet. Of the local applications, ointments used to be most employed, but the preference is now generally given to various metallic solutions, such as those of the sulphate of zinc, acetate of lead, and sulphate of copper, in the proportion of from one to three grains to the ounce. It seems probable that the moist nature of these applications is of more consequence, in producing the effect desired, than the substances dissolved in them, since water alone answers very well for the purpose. These washes, as they are called, ought to be varied occasionally, as habit lessens their effect; and with the same view a poultice ought to be applied from time to time. Pressure is always useful, and ought to be exerted by proper bandages. Several folds of lint, moistened with the wash, should be laid over the sore; and thin sheet-lead, cut to the size of it, and laid over the lint, is also very advantageous. Between the lint and bandage it is proper to interpose a piece of oiled silk, to prevent the lotion from soaking away and leaving the sore dry.

The Indolent or Callous Ulcer is distinguished by a smooth surface, generally depressed, and having no appearance of granulations, of various colors, brown, gray, or white, and looking as if varnished; a viscid tenacious fetid discharge; a circular or oval figure, with little irregularity; and thick white edges, seeming as if composed of accumulated cuticle. There is no circumscribed hardness in the immediate neighborhood of the ulcer; but there is always considerable diffused swelling of the limb in which it is seated. The swelling is not soft and yielding, like that of common œdema, but firm and incompressible. The pain is very variable. There is no appearance of cicatrix, so long as the sore retains its indolent characters.

Ulcers of this description are confined almost exclusively to the legs of people advanced beyond middle age, and constitute a very troublesome subject of surgical practice, as they are very apt to recur after being healed. Some people, partly from the fear of injuring the system by suppressing a long-continued discharge, and partly from the despair of effecting a permanent cure, bestow little care on the treatment of these complaints; but this is wrong, since the most unpromising cases, under proper management, are often remedied; and there is hardly any disease which interferes more seriously with the patient's comfort, or unfits him more for the active duties of life. It is chiefly met with in the laboring poor, and often produces the greatest misery, by impeding or altogether preventing the exertions which are required for maintaining the patient and his family.

I have found that the application of a large blister, covering the sore and a considerable part of the limb, greatly hastens the cure, and frequently proves sufficient for its completion, without the use of any other means than moist dressings applied afterward. The immediate effect of this practice is removal of the swelling—the thick callous edges disappear—the surface of the ulcer comes to be on a level with the surrounding skin—granulates and cicatrizes. In favor of this treatment I may mention, that it is more speedy and lasting in its effects than the strapping process—and much more economical, which is a point of great importance in treating the poor people who usually suffer from the disease—since the expense of strapping and bandaging their limbs very often prevents the treatment from being undertaken.*

ULCERS PREVENTED FROM HEALING BY EXCESS OF ACTION.

These ulcers have an angry or irritable look, owing to redness of their own surface and that of the surrounding skin. In general, they are deep, of a brownish-red color, and show no granulations—they are irregular in shape—their edges are abrupt and usually ragged—their

* Second Report of the Edinburgh Surgical Hospital.—*Med. and Surg. Journal*, No. 102.

discharge is thin, serous, and often tinged with blood. Sometimes they are superficial—of a regular circular form—and exhibit no redness except a bright line at their margin. The pain attending them is almost always acute. They form no cicatrix so long as they retain their irritable characters. Irritable or overacting ulcers are met with in full over-fed subjects, who possess strong powers of action, and in weak irritable individuals. They may also occur in any one as the effect of continued irritation, whether direct or indirect.

The treatment consists in removing all sources of irritation, and using those local applications which have a soothing tendency. Of these, heat and moisture, as afforded by fomentations and poultices, are the best; and their effects may be increased by using decoctions of poppy heads, solution of acetate of lead with opium, etc. Scarification of the edges of the ulcer, or leeches, may also be employed if the symptoms are severe, but it is very seldom necessary to do so. Bleeding, purging, calomel and opium must also be resorted to according to the state of the system, so as to reduce excessive power of action, and allay inordinate irritability. In relieving the ulcer from irritation, it should be recollected that motion has a powerful effect in causing or increasing it, and rest, therefore, ought to be strictly enforced.

Ulcers of this kind sometimes go on progressively enlarging, and are then said to be Phagedenic. When the overaction runs still higher, so as to destroy the life of the part, it constitutes what is called a Sloughing Ulcer. When mercury is given profusely or indiscriminately, in the treatment of venereal affections, it frequently induces such irritability as to make the sore assume phagedenic or sloughing characters. The patients in crowded ill-ventilated hospitals sometimes suffer from sloughing of their sores, attended with great destruction of the parts, or even fatal effects on the system. This Hospital Gangrene, as it is named, no doubt depends on the unwholesome atmosphere exciting preternatural irritability, and the treatment, therefore, essentially requires removal from the sphere of this deleterious influence. Other means will hardly be required if this be afforded, while the most careful administration of dressings and medicines will be of little avail so long as the grand desideratum is withheld. The age, strength, and previous circumstances of the patient may render it proper to vary the subordinate treatment by bleeding or stimulating, fomenting or cauterizing. The hospital gangrene, as described by military surgeons, is not met with in civil hospitals to such a formidable extent, but a degree of the same effect, proceeding from a similar cause, is of frequent occurrence, and demands similar measures for its remedy.

In the forms of this affection which I am accustomed to see, the

first sign of its commencement is the appearance of one or more small superficial circular excavations, looking as if scooped out with a nail in the surface of the sore. They have a yellow or grayish-yellow color, and are devoid of granulations. Rapidly extending and coalescing, they entirely alter the aspect of the ulcer, which, partly from swelling of its edges, and also from phagedenic action, at the same time, becomes much increased in extent. A soft, spongy slough, of a dirty white color, next presents itself, generally extending over the whole surface, but varying in its thickness. While these local changes are in progress, and apparently keeping pace with them, a general derangement of the patient's system is observed. He acquires a sickly yellow aspect, loses his sleep and appetite, and has an extremely quick pulse, together with the foul tongue, and all the other symptoms of feverish disturbance. By-and-by, in the course of a week or ten days, this state of matters begins to improve; the sore gradually regains its former characters, and, though often very much increased in size, usually heals more quickly than might be expected—the general health undergoing a correspondent change. After trying a great variety of treatment without any sensible benefit, I have for some years past come to regard the attack as one that should be trusted very much to spontaneous recovery. It is more troublesome than dangerous; even in the cases of compound fracture and amputation, hardly, if ever, leading to the loss of limb or life, but merely protracting the cure. A poultice seems the best dressing that can be applied until the sloughs begin to separate, and the only internal remedies that appear useful, are laxatives in the early stage to regulate the bowels, and a moderate allowance of wine in the more advanced period of the complaint.

ULCERS PREVENTED FROM HEALING BY PECULIARITY OF ACTION.

It was formerly thought that all the ulcers which resisted the means of increasing and diminishing action, owed their obstinacy to peculiarity of disposition, whence they were named specific sores. It is now well ascertained that a very large proportion of these so-called specific ulcers depends on some irritation, direct or indirect, after the removal of which they readily heal.* The most common cause of irritation in such cases, is that which proceeds from suppression of the secretions, especially those of the digestive organs, the remedy of which consists in correcting the patient's errors in regimen, and subjecting him to an alterative course of medicine. For this purpose nothing answers so well, in general, as restricting the diet, increasing the exercise, and prescribing daily doses of the carbonate of soda with rhubarb—as half a drachm of the former, and six grains of the latter. The local

* Abernethy on the Constitutional Origin of Local Complaints.

treatment must be regulated by the condition of the ulcer as to excess or defect of action; but, generally speaking, lotions answer best, and of these the black-wash, which is formed by decomposing calomel with lime water in the proportion of eight or ten grains to the ounce, and a weak solution of sulphate of copper, are the most useful.

Ulcers depending on the suppression of other habitual discharges, such as the menstrual, should be treated on the same principle, the particular means employed being varied according to the circumstances of the case.

When an ulcer continues to exist without any local or constitutional irritation to account for its doing so, the obstinacy may then be fairly referred to peculiarity of action. This morbid disposition is either confined to the ulcer, or exists generally throughout the system. Specific ulcers may accordingly be divided into Constitutional and Local.

Specific Ulcers present every variety of character. Their color is usually gray, yellow or purple; their surface is sometimes deeply excavated; at other times elevated into fungus growths, presenting a sort of cauliflower appearance. Their discharges vary without limit as to color, consistence and quantity. The pain attending them is also very variable. The cicatrix exhibits various peculiarities in the mode of its formation, often commencing in the center or at one side, and shooting over the remainder of the area, or going on at one part while the ulcer extends at another, and being in general considerably depressed below the surrounding surface, but not unfrequently elevated into projections above it.

The treatment varies with the nature of the general or local disposition which maintains the ulcer. It is for the most part proper, in the first instance, to destroy the surface with caustic potass, or nitrate of silver, or to touch it with a saturated solution of the sulphate of copper, and then to apply black-wash, and subject the patient to an alterative course of regimen and medicines. If it appears that the patient's system has been generally disordered by any unhealthy influence, such as that of mercury and the venereal poison, the recovery may be greatly accelerated by administering medicines which act as antidotes, as the hydriodate of potass, or iodide of iron. When these means fail, strong preparations of mercury and arsenic are sometimes employed locally to destroy the diseased action, such as the arsenite of potass, the white oxide of arsenic, the red and gray oxides of mercury applied in substance or ointment, or the oxymuriate of mercury. In using these poisonous agents, it should be recollected that an ulcerated surface possesses the power of absorption, so that proper caution must be observed to prevent them from producing disagreeable effects on the system.

When the ulcer resists every means employed to induce a healing action, it is generally named a Cancer, the only remedy for which is extirpation. This may be effected by caustic and cautery, the ligature, and the knife. The first mentioned means are proper where the sore is of no great depth, or of much extent; the second where hemorrhage might be profuse, and could not be easily restrained; the third, or excision, is the easiest, least painful, and most certain method in the great majority of cases.

The different morbid dispositions, which have now been considered, may exist together, so as to complicate the appearance and treatment of ulcers. An indolent ulcer of the leg, by intemperate living and the excitement of motion, frequently, in addition to its own characters, presents some of those which depend on irritation, such as redness and pain. These subside under the influence of poultices and rest, so as to leave the indolent characters alone. Specific ulcers show every variety of underacting and overacting characters, according to their particular circumstances, and consequently require a variety of treatment beside that which their peculiar nature demands.

[Mr. Syme, in his views upon ulcer and its varieties and treatment, is, in my opinion, too general; indeed, he has treated of the *science* of treatment rather than the *art*. I shall, therefore, go over the entire ground, introducing such observations and cases as may seem to be demanded.

Healthy Ulcer.—There is an ulcerative process, which in every sense seems to be normal. It is more of a suppurative than an ulcerative or destructive process. It is characterized by redness of the surface, want of fetor, the pus being consistent and easily removed, and small regular granulations. This species of ulcer heals spontaneously, leaving but little cicatrice to mark its former location. This form of ulcer requires little or no treatment. The common carrot or comfrey poultice, and a little salve to protect it from the atmosphere, being generally all that is required.

Irritable Ulcer.—This form of ulcer is exceedingly sensitive, and readily bleeds when touched. Its color is of a dark-purplish tint. It discharges but little matter, and that is often of a sanious character, very corroding, and not unfrequently quite fetid. Its granulations are imperfectly formed, spongy, and are either of a reddish or whitish vascular look. The granulations are not common to the whole surface, but appear in patches, and may disappear and be absorbed after they have once appeared. As stated in a former note, the edges of this ulcer are generally ragged and uneven, and the whole is surrounded by a swollen, reddened and often œdematous condition. This variety of ulcer much oftener attacks females than males, and is more apt to occur in the vigor of life than when either quite young or old.

It is often quite painful, and by breaking the patient's rest, the general health suffers; hence we generally find the patient suffering from thirst, chilliness and great nervous prostration. This variety of ulcer is apt to become gangrenous; hence, in treating it, we should be careful to prevent any approach to gangrene as much as possible. In the treatment of this form of ulcer, I have found that the most reliable agents are those of a soothing nature; fomentations of hops or poppy leaves are often of great benefit; frequent bathing of the ulcer with sassafras or slippery-elm water will be found very advantageous. As a dry application, equal parts of liquorice root and slippery-elm bark is, in my hands, without an equal. Dry agents are indicated only when moist applications have been used so long as to lose their power over the irritability present. Dry applications, like moist ones, may also fail from long use, and, in that event, we had better return to the moist ones again. As constitutional remedies, I prefer a combination of phytolacin, stillingin, asclepin and sanguinarin, or of podophyllin, senecin, scutellarin and sanguinarin, or the asclepin may be given in full doses alone. It will also be found a good plan to give some good vegetable tonic, as xanthoxylin and hydrastin, during the course of treatment. If under this course of treatment (always avoiding purgatives) the skin does not become moist, and the secretions healthy, I would recommend the administration of lobelin, sanguinarin and phytolacin, as those agents which seldom or never fail to effect the object.

Indolent Ulcer.—Here we have conditions entirely opposite to the irritable form just noticed. The general character of the ulcer is chronic—the edges are smooth. It is deeply excavated, having a flat surface covered by badly-formed granulations. It is most apt to occur in men, about the middle period of life, and is commonly situated on the outside of the extremities, between the ankle and calf, but most commonly at the lower edge of the calf. It is the most common form of ulcer presented to the surgeon for treatment; and notwithstanding the respectable age which many of them have attained, I believe the great majority of them curable. This ulcer might be (as it has been by various surgeons) termed a Torpid Ulcer. The vital powers are weak; and hence the plan of treatment must be just the reverse of that recommended in the treatment of irritable ulcer. Here, instead of sedation or soothing remedies, we require those of a stimulating and exciting character. The fungus growths in this class of ulcers may be readily dissipated by the free use of either the sulphate or chloride of zinc, and a poultice of elm bark. A good wash for this class of sores, is a weak solution of zinc combined with a decoction of xanthoxylum. Where the parts adjoining the ulcer are very hard, I have sometimes used very stimulating lotions; there is little danger of stimulating this ulcer too much; for if it should even be changed

to an irritable condition, the soothing plan already pointed out will speedily reduce it to a healthy condition. Let it be understood, that if the sore is frequently well washed also with strong warm soapsuds, it will seldom be offensive to the smell. The tincture of myrrh and sanguinaria are often employed to stimulate them to healthy action, but I have found nothing better than xanthoxylin, hydrastin and myricin, made into a paste, with the addition of a very small quantity of pulverized ginger.

Varicose Ulcers.—These ulcers are so named from the varicose condition of the surrounding veins; they may be either irritable or indolent, along with the addition of the varicosity of the veins. Erichsen's description of this ulcer is very complete: "In this affection of the venous trunks, the skin gradually undergoes degeneration, becoming brawny, of a purplish-brown color, and being traversed in all directions by enlarged and tortuous cutaneous veins. The ulcer forms at one of these congested spots, by the breaking down of the already disorganized and softened tissue, forming a small irregular chasm, of an unhealthy appearance, and varying much in character, being sometimes inflamed, and at others irritable or sloughy, and then becoming indolent." This variety of ulcer is nearly always tender to the touch; often very painful, and especially when the limb is in motion. The nervous system may and is sometimes so affected by this pain, that actual delirium supervenes. They occur generally on the lower extremities below the knee; all the surrounding cutaneous veins are involved; and the ulcer may be either deep-seated or superficial, but the color is generally deep. Sometimes this variety is attended with much hemorrhage, which may be stopped by elevating the foot above the level of the body, and compressing the bleeding vessel. The veins are sometimes taken up and compressed, but this is by no means necessary. The treatment of this kind of ulcer will be conducted as any other ulcer not varicose. If indolent, treat it as an indolent ulcer simply, together with the special appliances for the varicose condition; if irritable, treat it as an irritable ulcer with this addition.

I have used the chloride of zinc in a large number of cases with the most happy effect, and will give the treatment of one case, which will fully illustrate its value in this form of ulcer:

Mr. C., of this city, in 1849, was the subject of varicose enlargement of the veins of the lower extremities, and had been suffering from this cause for several years. While attempting to draw on his boot, his finger slipped, and the nail coming in contact with one of those veins, it was ruptured. It was followed by copious hemorrhage, which lasted at intervals for several hours. The compress and bandage were applied, which prevented any further escape of blood. But instead of healing, as was desired, it soon presented the worst form of the

indolent ulcer, so much so, that the attending physicians finally, after treating it for several months by various plans of medication, discontinued the treatment, and advised Mr. C. to have his leg amputated, as the only means of cure. He declined to comply with their request.

I was then called to take charge of the case, and immediately applied the chloride of zinc, after dissolving it in a sufficient quantity of water to form a cream-like consistency; to this I added enough flour to form a paste, and then covered the ulcer with it. It produced severe pain, which lasted several hours. I continued to apply this plaster every day, until all the indurated edges, and so far as I was able to judge, the whole morbid structure, was submitted to its action; I then applied the elm bark, mixed with cold water, until the eschar sloughed off, which required five days; after which I applied the "Unguentum Plumbii Compositum" of the Eclectic Dispensatory. Such was the effect of this treatment in this case (and, I may add, in many others), that the ulcer was perfectly cured in three weeks.

And let it be distinctly understood, that vegetable astringents will not heal in any reasonable time this conditioned ulcer.

Mr. Syme, in the Medical and Surgical Journal, has the following article on ulcers, which is here introduced for want of a better place.—R. S. N.]

In 1829,* I proposed a different plan of treatment, which has now stood the test of sixteen years' trial in most parts of the world, and may, I think, be regarded, in every point of view, as preferable to the other. This was to apply a large blister over the sore and neighboring swelled part of the limb, which has the effect of speedily dispersing the subcutaneous induration and thickening, so as to relax the integuments, and thus remove the obstacle opposed to healing action. In the course of a short time, seldom exceeding a few days after the blister has been applied, the surface of the ulcer, however deep it may have been, is found to be on a level with that of the surrounding skin, not, of course, through any process of reproduction or filling up, but merely from the removal of interstitial effusion, allowing the integuments to descend from the position to which they had been elevated, as may be readily ascertained by measuring the circumference of the limb, before and after it has undergone the effect of blistering. But, along with this change of form, the ulcer in other respects no less speedily acquires the characters of a healing sore, assuming a florid color, affording a moderate discharge of purulent matter, and presenting a granulating surface with surrounding margin of cicatrizing pellicle. No subsequent treatment beyond the attention requisite for ensuring quiet and cleanliness is needed, and recovery is completed not

* Edinburgh Medical and Surgical Journal, Vol. xxxiii, p. 21.

only more quickly, but with much less tendency to relapse than when accomplished by other means.

The facility, rapidity, economy and lasting effect of this treatment, seem to give it a decided advantage over the other methods in use; and, so far as I am aware, no one who has tried the plan ever afterward hesitated to employ it in preference to any other. In order to derive the full amount of benefit which the practice affords, it must be carried fairly into effect; and with this view, the principle upon which it is founded should be distinctly understood. I still entertain the opinion originally expressed, that the blisters act beneficially by inducing a process of absorption. The enlargement of the limb being of secondary formation, and resulting from the continued irritation of a sore allowed to remain unhealed through neglect or improper treatment, when once established, prevents the contraction of granulating action, by which alone solutions of continuity, not within reach of union by simple adhesion, admit of reparation. Pressure, the horizontal posture, and all other means that tend to remove the obstacle thus presented, will promote the patient's recovery. But of all the means that can be employed for this purpose, blisters appear to be the most efficient, and should, therefore, be employed for the remedy, not only of the purely indolent or callous ulcer, but of other kinds, which, in addition to their own peculiar characters, show evidence of complication with indurated enlargement of the limb. From this condition, it is hardly necessary to mention that the œdematous swelling of weakness and impeded circulation must be distinguished.

With regard to the Varicose Ulcer, I have merely to state that my opinion is not in favor of aiming at what is called the "radical cure," by obstruction of the vein or veins concerned. The ligature of Sir Everard Home, the incision of Sir Benjamin Brodie, and the caustic potass of Mr. Mayo, have been succeeded by the much more sure, safe and effectual method of Velpeau, who accomplishes the object of obliteration by passing a pin through the skin under the vessel, and then tying a thread tightly round the included part. I have frequently practiced this procedure, and never met with any bad consequences from doing so; but am nearly satisfied, from what has fallen within my observation, that the operation is barren of good effects in permanently remedying the tendency to ulceration. If this should prove to be the case, it will be matter of less regret, on account of the improvements which have been made in conducting the palliative treatment, especially by the contrivance of elastic bandages and supports, much more convenient than those formerly in use; and by means of which, after the sores are healed, patients may be rendered not only comfortable, but pretty secure against relapse. The *Black-wash* has long seemed to me the best application for promoting cicatrization of the

ulcer. If it comes under treatment in an inflamed or irritated state, poultices should be employed in the first instance, and if the depressed surface and thick edges denote a complication of the callous condition, blistering will be proper instead of such relaxing means.

The Mercurial Ulcer of the legs, or that which proceeds from the injurious influence of mercury upon peculiar constitutions of the system, occurs in two different forms, being either superficial, and confined to the integuments with their subjacent cellular texture, or deeply seated in the periosteum and surface of the bone. The former is preceded by flattened indurations of the skin, which, after slowly suppurating, discharge their contents by different apertures that communicate together, so as to produce an irregular ulcerated surface, with burrowing sinuses. The latter generally occupies the shin, and is recognized by its firm connection with the bone, which appears enlarged and irregular, either from really being so, or from the deceptive thickening of its periosteum.

The superficial mercurial sore was formerly treated more by internal than external remedies; and, like the other effects of mercury co-operating with venereal poison upon unsound constitutions, being regarded as the legitimate offspring of syphilis, received under the title of antidote a fresh supply of the poison which had given rise to it. The changes immediately attending this most mistaken and mischievous practice, being usually beneficial so far as existing symptoms were concerned, tended to confirm the delusion, which too frequently led the patient, by progressive steps of weakness, emaciation and disease, to his grave. The enlightened views of the late Dr. Thomson gave Edinburgh a distinguished place in reforming this department of medicine; and though the comparatively slow progress of improvement in the capitals of England and Ireland, may still, perhaps, tolerate the administration of mercury for the ulcer in question, it was long since abandoned in this school, and succeeded by a treatment of a local kind. This was destruction of the textures concerned by application of the caustic potass, which, at once depriving them of vitality, reduces the parts surrounding and uniting the ulcers to a state of slough, which separates in due time under the employment of poultices, and presents a healing surface of granulations.

This procedure was certainly efficient, but very painful, and often required repetition before recovery could be completed. It, therefore, readily gave place to the more recent introduction of iodine, as a corrective of the constitutional derangement which gives rise to ulcers of the kind under consideration, as well as to other so-called syphilitic symptoms. Small doses of the hydriodate of potass, such as two grains, three times a-day, administered in simple watery solution, and without any sarsaparilla—of which I never prescribed a particle, either

solid or fluid, in hospital practice—quickly affords the relief desired, with no assistance except the application of lint moistened with water, or a diluted solution of sulphate of copper, and occasional blistering, especially if there be much thickening and induration.

The deep-seated form of mercurial ulcer which affects the periosteum and surface of the bone, has been, and I fear still is, in some parts of the world, the subject of more unwarrantable and hurtful practice than almost any other surgical ailment, although it admits of treatment peculiarly safe, speedy and effectual. This is merely the application of blisters over the whole extent of enlargement, followed by the use of simple lotions and gentle pressure, while the hydriodate of potass is administered internally.

At no very distant period, this form of ulcer being attributed to the direct effect of syphilis, was considered a warrant for repeated courses of mercury, and long-continued drenching with sarsaparilla, with benefit, it may have been, to the apothecary's pocket, but with what loss to the patient's health may be imagined, now that mercury is known to be the principal source of the evil it was employed to remedy. The local treatment also of those days was hurtful; in the first place, by opening, through means of incisions or caustic, abscesses of the periosteum, which readily admit of absorption, under the same management that proves useful after ulceration has taken place; and secondly, by confounding the rough surface of bone so exposed with that most obstinate of diseases, Caries. Under this erroneous impression, operations no less severe than unnecessary were performed. I have seen the choffer bristling with cauteries carried into the operating theater, while unfortunate shin-bones were rasped and chiseled, preparatory to the burning thought requisite for their remedy. I have also known cases which had resisted the prolonged horrors of these rough and frequently-repeated proceedings, yield at once to the application of blisters.

But there is reason to fear, that operations still more severe, and, if possible, still less warranted, have been performed, on account of chronic swellings affecting the periosteum and bone, through the proposal of Sir Benjamin Brodie, to trepan the tibia for the discharge of matter pent up in its cancellated texture. The symptoms of this abscess, as described by that gentleman, are enlargement toward one extremity of the bone, pain more or less severe, usually remitting and recurring with increased intensity at variable intervals, induration and adhesion of the integument to the periosteum, tenderness under pressure, especially at particular points; in short, as he remarks with regard to one of his cases, "all the symptoms of chronic periostitis."*

* Lectures, page 397.

Now, if the two conditions are thus so similar, it is plain that the one which admits of remedy by the use of gentle means may be mistaken for the other, in which, it is alleged, nothing can afford relief except making an aperture by the trephine, for the escape of matter. Several patients, accordingly, have come under my care, after being advised in London to allow their tibias to be trepanned, and recovered completely without undergoing any operation. Indeed, Sir Benjamin Brodie says, that "even if you are mistaken in your diagnosis, no harm can arise from the operation. Nay, it is a question whether good may not arise, under certain circumstances, from taking away a piece of bone when it is affected with chronic inflammation, even though there be no abscess." * And he illustrates this view by relating a case in which recovery followed the boring of a hole through the humerus in search of matter, without any being found. But, with all deference to an authority so justly respected, I must protest against the license thus afforded to practice an unnecessary, painful, and, as I believe experience would show, dangerous operation; especially as the affection admitting of remedy by the use of gentle means, is so much more common than chronic abscess in the tibia. I have for many years been looking for this disease, but hitherto without success; and, though not at all disposed to question the reality of such an occurrence, I feel entitled to regard its absence from the field of observation submitted to me, as a proof that it must be a rare event in the practice of surgery.

[Now, is it not exceedingly strange that physicians, with such facts before them, should ever administer mercurials in the treatment of syphilis? Its injurious tendencies have been pointed out again and again, for many years, by the more liberal class of physicians. And, with all deference to the opinions of Mr. Syme, I must be allowed to believe that even he will yet see that American surgeons have made some advances, even over those of Edinburgh. No doubt but Mr. Syme thinks the hydriodate of potass the best agent for ridding the system of its mercurial engorgements, yet we all know that there are many agents superior to this — e. g. podophyllin and stillingin in alterative doses; phytolacin, gelsemin, and leptandrin, in small doses; and, more recently, Prof. J. Milton Sanders has discovered that every particle of mercury in the system can be removed out of it and deposited by means of electro-magnetism. This process is now in daily operation.

Perhaps no discovery has been recently made which will be of greater benefit to humanity than that here announced. When we consider with what tenacity the practitioners of the allopathic faith

* Lectures, page 410.

still cling to the obsolete opinion of the virtues of mercury, and its very extensive use, even in the face of the honest warnings of such men as Mr. Syme, no one will fail to see that any process by which the system can be freed of its load of mercurial deposit, must be of very great advantage. Only those engaged in surgical practice can be aware of the great number of mercurial ulcers which come under the physician's notice. The cure of these "sores," by the ordinary practice, has hitherto been slow and uncertain, and almost invariably it has returned, even after an apparent cure. The pains, rheumatisms, and numberless complaints attending upon the presence of this irritant in the system, have, it is true, given employment to physicians and compounders of medicines — but it may be well questioned whether patients have been benefited thereby. If no one of the more recent and eminent authors of the age, had exposed the fallacy of mercurial treatment, one would be disposed to be more charitable toward those who continue to poison the system with mercurial preparations.

It is admitted by very many of the best surgeons in the world, that mercury only stimulates the ravages of the syphilitic virus, and that caries and ulcers of the bones do not occur unless mercury has been administered. Mercury then will induce these conditions, especially where the syphilitic virus is present. Now, are we justified in giving mercurials, since this virus may be introduced after its administration? I am induced to believe that there can be no warrantee for its exhibition in any case. The profession has been so long accustomed to regard mercury as the proper constitutional treatment in nearly all diseases, that it is generally believed no other agent will answer. This is a most erroneous supposition. Now what, it may be asked, is to be done with these "mercurial sores?" I answer: the discovery of Prof. Sanders, to which allusion has been already made, enables us, with very great certainty, to extract from the system every particle of mercury which may have been deposited in it, no matter how long the deposition may have existed. This declaration does not rest merely on theory, the statement can be tested any day in a most demonstrative manner.

The following cases are to the point: a man who resides in this city who was afflicted with a mercurial ulcer which extended from the foot to near the knee, applied for treatment. It involved the tibial articulations, and discharged a large quantity of very offensive matter. The man was about forty-five years of age, very weak, and suffering great pain. The ulcer was of the indolent kind; had existed for several years, and had been treated most of the time by different physicians. On placing him in the electro-magnetic bath, a heavy amalgam was left on the plate, leaving the distinct impression of the foot. Internally, I ordered the use of podophyllin, phytolacin, xanthoxylin,

of each half a grain made into a pill twice a day, and dressed the ulcer with the mild zinc ointment. The amalgam ceased to appear after the fourth sitting, and the electro-magnetic bath was discontinued. The pains and rheumatism ceased, the appetite was better, and in three weeks the patient was discharged cured. He is now engaged in active business.

I recently, for the second time, treated a case of mercurial ulcer of the sternum of fifteen years' standing. The patient had suffered very much with mercurial rheumatism. The ulcer was extensive, involving the sternal attachments of the third and fourth ribs, and passing over into the sternum about one inch. When first called to this case I found the ulcer so deep as to make an opening into the thorax. Not having a bath prepared at that time, I treated it with sulphate of zinc, and finally healed it, yet the patient still suffered with his aches and pains. Seven months after, the ulcer again appeared on the opposite side and was making rapid progress. This time I used the bath until no amalgam could be detected on the plate. The rheumatic pains disappeared, and the ulcer was readily healed by the mild zinc ointment and elm-poultice dressing. Until the present time the patient has had no return of the pains or other indications of disease.

It has often been questioned whether mercury deposited in the system could remain for any great length of time. But of this there can be no longer room for doubting; the electro-magnetic bath reveals it with great certainty, and physicians occasionally report cases fully establishing the fact that it does continue in the system for many years, a constant source of irritation. The following case was reported to the Boston Society for Medical Improvement, at the meeting of the society on the 28th of April, 1856, and by their secretary is reported to the Boston Medical and Surgical Journal, vol. liv, p. 439–40, of August, 1856:

MERCURIAL SALIVATION FOLLOWED BY PERIODICAL RECURRENCE.

Dr. Strong relates the case:—Miss ——, unmarried, about forty years old, was an invalid in early life, but now, for a number of years last past, with the exception of what will be stated below, she has enjoyed comparatively good health, rarely requiring the attendance of a physician, and using only laxative medicines, made necessary by a costive habit.

Eighteen years ago, about the first or third of October, she was salivated with mercury. The affection proved very severe, lasting several weeks. In the February following, being then in the hospital, and under the care of another physician, in consequence of the use of arsenic (Fowler's solution,) the salivation returned, with much the same severity as before, but she gradually recovered, since which time

she has taken no preparation of either medicine, except in one instance, when she took a few grains of calomel in pills, by mistake, by which she was again salivated; nevertheless, for the last eighteen years, and since the first salivations, she has had regular returns of the salivation without exception, in October and February of each year. It often returns on the same days of the month as at first—sometimes a few days later. These attacks, at first, were of great severity, as in the first salivation, and lasted several weeks; but they have gradually become less and less severe each year since, although, as before stated, they have never failed to occur at or near the time, and the attacks have always borne the character of mercurial salivation. They usually begin with irritable stomach, a feeling of fullness and pressure about the head, flushed countenance, heat and swelling of the gums, followed by swelled tongue and ulcerations of the inside of the mouth, of the tongue, gums and cheeks, with much drooling, and with the strong characteristic odor attending recent mercurial salivations. Dr. Strong had witnessed several of these attacks, and to him they appeared in no respect to differ from salivation following the immediate use of mercury. The patient herself asserts (and she is sufficiently intelligent) that each and every attack has been of the same character.

Dr. Strong remarked, that there had been for a long time, and is now, a great and strong prejudice among many against the use of mercurial medicines; and many who have used them, have been disposed to charge confidently all the subsequent ills and sicknesses, from whatever cause arising, to its use; and hence this prejudice has been so often appealed to, and used by quacks to ingratiate themselves and medicines with the public, and not without success. It is neither unreasonable nor improbable to suppose that much of the bad reputation of mercury, now abroad, has come down to us from the earlier times of its use, when, owing to ignorance of its power, or the best mode of administering it, its proper doses and times of continuance, great and irreparable mischief was done by it. The above case seems to give a color of reason to the common opinion.

Such cases are not uncommon. Numbers of cases of mercurial ulceration may be seen at my office every day; for since I have been using the electro-magnetic bath, I find quite an increased demand for its use. As I have obtained such satisfactory results from it, I introduce a description of the apparatus of Prof. Sanders:

It is a generally conceded fact, that a large majority of the diseases which afflict the people at the present day, are the result of mercury. The important discovery of Prof. J. Milton Sanders, that mercury can be extracted from the system years after it has been taken in, is proof that the deleterious metal lies secreted there, combined in some form with organic substances. We know that mercury is proved to

combine with organic matter, and that its affinity for such matter is even greater than zinc, antimony, arsenic, and the metals, which the late discoveries of Prof. Hofmann have indicated, do combine with organic radicals.

It was in the year 1844, that Prof. Sanders first made the discovery that mercury and other metals, foreign to the system, can be withdrawn from it, through the aid of the voltaic current. The discovery was also made at the same time, that the halogenes are susceptible likewise of being passed entirely through the body. These discoveries were published at the time in the Cincinnati Daily Commercial, and again in Hine's Herald of Truth, for September, 1847. In a word, these discoveries were demonstrated before many witnesses, and were published *seven years* before any other person pretends to have made them; and still, seven years subsequently, M. Vergnes comes forward and states that the discovery is his, he having discovered it in the year 1851! As the priority of Prof. Sanders' discovery is no longer disputed, but is conceded by scientific men, I do not feel disposed to waste further time upon a fact so indisputably authenticated. I shall devote my space to a description of the process, by which any person of ordinary ability may prove what has been so universally disputed. Perhaps no process since devised, is so simple and efficacious as the original one by which the discovery was made. The new Magneto-Electric Battery of Prof. Sanders has been adopted by that physicist in preference to the galvanic battery, but as my readers may not be able to get that piece of apparatus, I shall give such explicit directions, as will enable the mere novice in electricity to accomplish the extraction of mercury from the system without fail, if the least quantity of that metal shall be lodging there.

The most efficient battery for the purpose is that of Grove. This battery consists of a common glass tumbler, in which is placed a cylinder of zinc, well amalgamated, and in this metallic cylinder there is placed a cup of baked earthenware. In this cup there is suspended, attached to the arm of the zinc cylinder, a strip or ribbon of platinum foil. These batteries are thus charged and connected together. The zinc is placed in the tumbler, and the porous earthenware cup in the zinc. The portion of the tumbler containing the zinc, is filled with dilute sulphuric acid, composed of one part of the acid to eight or ten parts of water by measure. The porous cup is filled with strong and pure nitric acid. If this cannot be procured, then put into the cup a tablespoonful of pulverized and dried saltpeter, and pour upon this a solution consisting of one part of oil of vitriol to four or five parts of water.

The zinc cylinder has a projecting arm, to which is attached the platinum strip. This strip must fall into the acid solution contained

in the porous cup of the next battery, while the platinum strip attached to its zinc cylinder falls into the porous cup of the next one, and so on. By this connection, the batteries are arranged into a consecutive series, by which the greatest intensity is obtained. The wire attached to the *zinc plate* of one end of the battery, is the *negative pole*, while that attached to the *platinum strip*, at the other end of the series, is the *positive pole*.

For the purpose of extracting metals from the system, a porcelain or queensware basin is the best. It should be sufficiently capacious to hold both feet, with enough water to cover the feet as high as the ankles. This water should be acidulated with muriatic acid, in order to render it a more efficient conductor of electricity. The feet should rest upon a plate of copper, large enough to contain them, with at least one inch margin beside. The upper surface of this copper plate should be thoroughly cleaned and polished. The *negative pole* of the battery should be connected with this *copper plate*, while the *positive pole* should be held in the hand of the patient, or, better still, be placed at the back of the neck. It would be well to state, that the number of cups used *should not be less than ten, nor over twenty.* If of the former number, the sitting of the patient should never be over thirty minutes. If twenty cups are used, fifteen minutes is quite long enough for the passage of the current at one sitting. The copper plate—if the patient's system contains mercury—will indicate the presence of that metal, by a white nebulous cloud surrounding the place where the feet rested. Amid this white cloudy matter, the globules of reduced mercury can be easily discerned by the aid of a magnifying glass, or its presence can be proven by the proper re-agents. By heating this plate red-hot—which must always be done before repeating the experiment—the mercury is driven off. The acidulated water should be likewise thrown away, and the vessel carefully washed.

Professor Sanders also, at the time of the discovery of the electrolysis of mercury and other metals from the system, discovered that the halogene can be passed from the system by means of the voltaic current. This can be proven by resorting to Prof. Sanders' original experiments. Place in one hand, a cloth wet with a strong solution of iodide of potassium; in the other hand place another cloth, wet with a solution of starch. The negative pole must be held in the hand containing the iodide of potassium, and the positive pole in that containing the starch solution. In a few minutes the starch will give the characteristic blue color indicative of the presence of iodine. Professor Sanders has also passed chlorine and bromine through the body in the same manner.

Much skepticism has been evinced, especially by the allopathic profession, in regard to the withdrawal of mercury and other metals from

the system by means of the voltaic current; and, now that the discovery is deemed fallacious, full credit is given to Prof. Sanders as the sole discoverer of it. It will not be long before the truth of this great discovery will be verified by such authority as will forever lay at rest all caviling upon this point, when we shall expect nothing else than that some individual who was not cognizant that such a thing could be effected until he heard of it through Prof. Sanders, will raise up and claim this discovery as his own. But the truth is placed on record, which shows that Prof. Sanders discovered the electrolysis of metals and the halogene through and from the system, in the year 1844, and seven years before the M. Vergnes claims to have re-discovered the same thing.

We are particular to dwell upon the fact of who made the discovery of the electrolysis of metals through the system, as we consider it one of the most important discoveries of this age, and one which is destined to be of incalculable benefit to the human family.

We wish not to be misunderstood when we assert that at this present time the principal medical journals of this country are committed upon the point, that electricity will not withdraw mercury from the system. With that prejudice characteristic of the allopathic profession, and without testing the fact for themselves, they loudly assert that it cannot be done, and even ridicule the pretensions of the discoverer, who simply enunciates what he has effected hundreds of times, and what any school-boy can demonstrate in a few minutes.

The new Magneto-Voltaic Battery of Prof. Sanders is a great improvement upon the galvanic battery for the electrolysis of metals from the system, and for any purpose for which galvanic batteries are used. The current eliminated by this machine is fully equal, both in intensity and quantity, to two hundred cups of Smee's battery. Being a continuous current, and passing constantly in one steady direction, it subserves all the purposes of the voltaic battery without any further expense than the first outlay, as the electricity is obtained by the inductive action of permanent magnets. This machine, therefore, dispenses with all acids, or fluids of any kind, while the great desideratum of cleanliness and portability is attained. These machines are destined to come into general use for the purpose of curing disease, and extracting mercury and other deleterious metals from the system, or for any purpose which the galvanic battery of great power is used.

But when this machine cannot be obtained, ten to twenty cups of Grove's battery will answer every purpose, when used as directed above.

So universally is mercury administered at the present day, that, on an average, at least nine out of every ten persons have this delete-

rious metal in their systems. In consequence of this they are affected with one or more of those symptoms, or diseases, indicative of the presence of mercury.

It certainly is an easy matter to test the value of this discovery, and I am of the opinion that an enlightened medical public will give it a fair trial.—R. S. N.]

CHAPTER VI.

SUPPURATION.

PUS.

Suppuration consists in the formation of a peculiar fluid named Pus, which possesses the following characters: It has nearly the consistence of cream; it has a pale yellow or straw color; it occasions no smell while cold, but when heated to the temperature of the body emits a faint odor; it is opake, and when examined by the microscope, appears to be composed of globules suspended in a transparent fluid; it sinks in water; it is coagulated by muriate of ammonia: and sometimes has its fluidity diminished, merely by removal from the body.

It was formerly believed that pus originated from putrefaction or degeneration of the blood and other fluid or solid parts; and a loss of substance or breach in the continuity of the solids was thought essential to its formation. It is now ascertained that pus is produced by a peculiar secreting action of the capillary vessels, which may occur without any solution of continuity. The mucous membranes, after being inflamed, frequently take on the suppurative action; and the purulent secretion of granulations may be quoted as another instance, since the pus is discharged here at once from the vessels. A granulating surface in several respects bears much resemblance to a mucous membrane, and may be regarded as a temporary covering instead of skin. Pus varies very much in consistence, color, and other properties, from admixture of blood, the nature of the part, or the constitution of the patient.

Suppuration may be divided into superficial and interstitial.

SUPERFICIAL SUPPURATION.

Superficial Suppuration is that which takes place from the surface of the mucous membranes, as the urethra or conjunctiva. It was not

admitted by the older surgeons, who accounted for the discharge in such cases either by calling it mucus, or by referring it to some solution of continuity out of sight.

Purulent discharge from a surface, or a running, as it is generally named, is, in the first instance, accompanied with symptoms of the inflammatory action which preceded it, particularly heat and redness, which require measures of a soothing kind, such as bleeding, purging, warm fomentations, etc. By-and-by these subside, and the discharge alone continues, when the treatment must be altered to the use of stimulating and astringent applications, such as metallic washes, ointments, etc.

[It is a little strange that it should not have occurred to surgeons, that if the exhausting measures of bleeding, purging, etc., had not been adopted, the process of stimulation would not have been required. This is only one of the inconsistencies arising from the false principles upon which practice has been based.—R. S. N.]

INTERSTITIAL SUPPURATION

When suppuration takes place within the texture of the body, there results a collection of pus, which is named an Abscess. The matter sometimes is diffused through the interstices of the cellular texture; but more frequently is contained in a circumscribed cavity, which is limited by the effusion of lymph, forming a sort of capsule or containing-bag.

When inflammation terminates in the formation of an abscess, the pain loses its intensity, and changes to a throbbing sensation. The tension also diminishes, but the swelling does not subside; on the contrary, it rather becomes more prominent; and when pressed upon by the fingers gives the feeling of a fluid contained in a bag, which is called Fluctuation. The particles of a fluid being equally movable in all directions, when pressure is made at one part, an impulse is necessarily communicated over the whole surface; and if the fingers be placed at different points, the extent of the cavity may be ascertained. When the collection of matter is small, or thickly covered, a very nice and practiced sense of touch, the *tactus eriditus*, is requisite for recognizing fluctuation. If the abscess on the other hand, be very large, simple percussion at one point is sufficient to detect it. When the suppuration is extensive, or seated in any important region of the body, such as the cavity of the cranium or pelvis, its commencement and progress are usually attended with rigors of various degrees and duration.

It has been questioned whether or not suppuration may occur without being preceded by inflammation. There can be no doubt that the symptoms of overaction previously, are often very slight, and

they probably ought not to be regarded as essential; but in the great majority of cases, suppuration certainly is a consequence of inflammation.

The contents of an abscess may be removed by the powers of the system in two ways. They are sometimes simply absorbed into the mass of circulating fluids. This happens most frequently in the case of abscesses connected with the periosteum and lymphatic glands, or those of the groin; and it is worthy of notice, that, when such absorption takes place, no bad symptoms follow. It is now generally believed that, when pus is formed within reach of the cavities of vessels, as in a recent wound where the effusion of lymph is imperfect, or within the interior of veins, so that it may enter the circulation without passing through the modifying operation of the capillaries, a portion is apt to gain admission, and, preserving its characters so as to be distinguishable by the microscope, becomes the source of purulent deposits in other parts of the body. Another explanation of such secondary purulent deposits, as they are called, is, that, in certain local suppurations, the whole mass of circulating blood sustains an alteration in its condition predisposing it to secrete pus; just as during inflammatory fevers, while lymph is thrown out from the capillaries, it separates more readily than usual from the blood during coagulation, and presents the buffy coat. As the globules of the blood and pus differ but slightly from each other, it is easy to conceive that some slight change, attending this morbid condition, may occasion the appearance which has been thought to denote the presence of pus in the blood. Much more frequently the pressure of the matter causes absorption of the surrounding parts, and, in conformity with the general law that those yield to it most readily which lie nearest the surface, the covering of the abscess becomes thinner and thinner, so that the skin alone remaining, it projects from the distension of the fluid, and becomes so thin as to allow the color of the pus to be perceived through it. The abscess is then said to point, and soon afterward, the absorption still continuing, an aperture takes place, which allows the contents to escape. A discharge of matter issues from the opening for some time afterward, but gradually becomes thinner, and diminishes in quantity until a cicatrix is formed.

It is generally stated that this process of cure depends on a growth of granulations from the whole surface of the cavity, which is thus gradually filled up. But if this were the case, it is plain that there ought to be a permanent solid enlargement of the part concerned; for pus does not proceed from the breaking down or softening of the natural tissues, as was formerly supposed, and is merely secreted by the vessels into the interstices between them. It separates the muscles, condenses the cellular texture, and elevates the skin, so as to

obtain room for its reception; but so soon as vent is afforded for its escape, all the parts that have been pressed aside resume their natural situation, the cavity of the abscess is thus at once greatly diminished, and the contracting effect of the granulating action which ensues upon its surface completes its obliteration.

Instead of waiting for the natural evacuation of abscesses, it is usual to make an artificial opening, in order to hasten the cure. This ought not to be done in general until the fluctuation is distinct, especially if the abscess be seated in a glandular texture, as the process of reparation is otherwise apt to be rendered slow and imperfect. On the other hand, if the abscess is left entirely to itself, the skin frequently becomes so thin and impoverished at the part where it points, that it does not possess sufficient power of action for uniting with the subjacent surface; the matter also may extend over a greater space; and the patient suffer much more pain than he would have done if the abscess had been opened. When the patient is in great suffering; when there is reason to believe that the matter is forming under some thick fascia, or other covering that resists its progress to the surface; or when the matter appears to be diffused in the cellular substance, it is improper to wait for pointing, and is impossible to make an opening too early. When the suppuration takes place in a gland, or any morbid structure, it is proper to let the abscess either open naturally, or at all events be most completely formed before interfering with it. In other cases, so soon as the fluctuation can be distinctly perceived and the abscess points, the opening should be effected.

After the matter begins to form, and before it is evacuated, poultices and fomentations are applied, as they are believed to hasten the process of suppuration.

Abscesses may be opened either by the knife or caustic. The former is infinitely less painful and more certain. The best instrument for the purpose is either a straight or curved sharp-pointed bistoury, which answers much better than the old-fashioned abscess lancet, an instrument shaped like a common lancet, but of a larger size. The narrow blade of the bistoury allows the point to enter the cavity with little or no pain, and then being pushed through the skin a second time from within outward, at the part to which it is desired the incision should extend, quickly completes the aperture. If the parts to be divided are too thick for proceeding in this way, the knife may be carried through them by a sawing motion to the requisite extent. It is always right to make a large opening; and, as a measure for determining its size, the breadth of the part of the abscess which points may be taken, if it does not exceed an inch and a half or two inches. After the matter escapes, so far as it is induced to do so by the contraction of the parts containing it, a piece of lint should be

placed between the lips of the wound, to prevent them from uniting by the first intention; but care must be taken that it is not so thick or forcibly introduced as to confine the discharge, and consequently oppose the obliteration of the cavity. When the bleeding has ceased, a poultice should be applied, but not before, since a troublesome hemorrhage may otherwise ensue. In some situations great difficulty is occasionally experienced in arresting the flow from arterial branches divided by the incision, from their resisting the efforts of pressure, and not admitting the application of ligatures, owing to the softened state of the texture surrounding the orifices. In such circumstances, the best method is to pass a needle through the integuments into the cavity, and then bringing it out so as to include the vessel in a ligature, which being tied, proves certainly effectual, and may be removed when it ceases to be required. The poultice may be continued for a few days to promote the escape of matter secreted by the surface of the abscess, and then simple ointment, or wet lint, supported with a proper bandage, should be employed until the cure is completed.

When caustic is used, it should be applied as if for making an issue; and in case it does not extend its effect through the whole parietes of the cavity, a knife may be pushed into the eschar or slough caused by its operation. Patients who could not bear the idea of having their sound skin cut, have sometimes comparatively little objection to this.

Some practitioners prefer caustic for opening abscesses, on the ground that, while making the aperture, it hastens the suppurative process. But if means for this purpose are required, there are others which can be used with more effect, and leave the opening to be made by the more eligible method of the knife.

When, owing to peculiarity of the part or patient, it is desirable to avoid making a breach in the surface, means should be used to promote removal of the matter by absorption. The best of these are blisters, followed by pressure. The cases in which they can be used with effect, are chiefly those of slow suppuration in the glands, and under the periosteum.

Abscesses are said to be chronic or cold, when the symptoms of inflammation, which precede them, are mild, or not at all observable. In such cases, the collection generally forms slowly and insidiously, so as not to attract attention until it attains a large size. Owing to the want of action that attends its origin, there is little effusion of lymph, and consequently little resistance to the extension of the matter; hence the swelling is often of an irregular figure, and readily changes its place according to the tendency of gravity. When the matter passes from one part to another, it constitutes what is called a congestive abscess. The contents of chronic abscesses are generally thin, and

bear no small resemblance to whey, especially as they usually have flakes of curdy-looking matter floating in them. The superjacent skin is generally not altered in color.

These abscesses have little disposition to evacuate themselves spontaneously, as the matter readily extends itself, and thus does not occasion sufficient pressure to induce absorption of the external parietes. It is hence the more necessary to make an artificial opening, but this cannot be done without some danger when the collection is large. The surface of the cavity, which not unfrequently is capacious enough to contain several pounds of fluid, sometimes inflames, and produces such violent constitutional disturbance as proves fatal in a few days. More frequently the bad consequence consists in a profuse and long-continued discharge from the morbid surface, by which the patient's strength is gradually exhausted, and Hectic Fever, as it is called, is excited. In this condition, the patient becomes excessively weak and emaciated; the countenance is extremely pale, with the exception of a red patch on the cheeks, which contrasts remarkably with the whiteness of the other parts of the face, and especially of the eyes; the pulse is quick and weak; he complains, particularly in the evening, of burning heat in the palms of his hands and soles of his feet; his skin is dry and hot; and he suffers from nocturnal sweats, often together with diarrhea.

[In the first place, the abscess need never be allowed to attain such a size; and secondly, if it has attained a large size, the sinking tendency may be obviated, if the patient be well braced up by tonics, and put upon a nourishing diet. There is but little doubt in my mind, that when hectic irritation is allowed to set in from the discharge of the contents of an abscess, the surgeon is chargeable with its induction.—R. S. N.]

This kind of disturbance is the usual result of continued irritation operating on a weak subject, and one of its most common causes, is the discharge that follows the opening of a chronic abscess. It used to be supposed that the matter occasioned the fever, by being absorbed into the mass of circulating fluids; but this opinion is now abandoned, and the effects on the system are attributed to the irritation which attends its secretion. Though the expression Hectic Fever is sanctioned by long use and universal acceptation, there appears to be good reason for laying it aside, since it leads directly and unavoidably to erroneous ideas of the condition which it is employed to denote. Fever implies disturbance of all the corporeal functions; but in the hectic state, those of the stomach, brain, and many other parts remain unaffected. Instead of Hectic Fever, therefore, it would perhaps be better to use the expression of Hectic Irritation. The effect of this irritation is to weaken the system more and more; at length fever is really induced;

the patient shivers; his tongue becomes foul; he loses his appetite; and speedily sinks under the disease.

A method of treating chronic abscesses was introduced by Mr. Abernethy, which has generally been regarded a great improvement. It consisted in drawing off, at first, only part of the contents, by means of a trocar, allowing the wound to heal by the first intention, and then repeating the puncture, with the interval of two or three weeks, until the collection was so reduced in size, that the cavity could be safely laid open and healed from the bottom as an ordinary abscess. If the abscess is large, the patient should be confined to bed, and kept quiet for some days previously and subsequently to the operation; for if these precautions be disregarded, even though the wound should heal by the first intention, there will be a risk of inflammation. Care should be taken to prevent the entrance of air, not because it possesses any power of direct irritation, but because it promotes putrefaction of the remaining matter, and in that way gives rise to the most violent disturbance. If there is reason to suppose that the abscess is connected with any incurable disease in the bones or elsewhere, it ought not to be opened, unless the cause of pain, or some other serious inconvenience; since doing so could only accelerate the patient's fate, and bring the surgical art into discredit. Such abscesses often exist for years without suffering apparently any change, or giving the patient much inconvenience, but upon being opened speedily prove fatal.

SINUS AND FISTULA.

When an abscess is seated in parts, the action of which is defective, owing to local or general causes, the cavity that remains after its evacuation does not contract completely so as to close, but continues to secrete a discharge, which is generally thin and copious, and then constitutes what is called a Sinus. The surface, in course of time, becomes condensed and smooth, so as to resemble a mucous membrane rather than the granulated covering of an ulcer; and if the discharge be copious, or any source of irritation exist, lymph is effused around the cavity, so as to thicken its walls, and render them almost of cartilaginous hardness. In such a confirmed state, the sinus is named a Fistula, but this term is usually confined in its application to sinuses connected with the natural excretory canals, as the urethra or rectum, the contents of which, by passing through the preternatural channel, prevent it from closing, and cause thickening of its walls. This hardening, or callosity, was formerly thought to depend on a morbid disposition of the part, and to require extirpation as an essential step to the patient's recovery. The operations practiced on this principle were extremely severe, and one of the great improvements derived from the more enlightened pathology of modern surgery, is their entire disuse, in this

country at least. It is now found to be sufficient, for remedying the induration, to remove the cause of irritation that induced it, the methods of doing which will be explained hereafter, in connection with the different regions of the body which are apt to become the seat of fistula.

In treating sinuses, the objects are to promote granulating action on their surface, and to press their sides together. They are not healed by *filling up* any more than the original cavity of the abscess, but contract until they become obliterated, or close more directly by union of the opposite surfaces.

Great care must be taken to avoid confining the discharge of the sinus, since, if prevented from escaping, it distends the sides of the cavity; and, for the same reason, it is always proper to afford the matter a dependent opening for its escape, either by enlarging the one already existing, or making a new one. The most effectual method of proceeding, is to lay open the cavity throughout its whole extent by incision; and it is not unfrequently necessary to resort to this practice when mild measures have failed, or the result of experience in similar cases authorizes the surgeon to dispense with their trial. When this practice is not admissible, pressure ought to be used externally, and the patient, by means of nourishing food, together with all the other adjuvants to the recovery of general health, should remedy, if possible, weakness of action in the system, if there seems to be any fault in this respect. It is at all times of great consequence to prevent motion of the part affected so far as possible. If the sinus is connected with any incurable disease, such as a carious bone that cannot be removed, or a malignant degeneration of the texture into a cancer, any severe measure would be obviously improper, and only those of the most soothing kind should be employed, with the view of affording that palliation which is all the case admits of.

CHAPTER VII.

DISEASED NUTRITION.

TUMORS.

By Diseased Nutrition is understood an action of the capillary vessels, which, instead of preserving the tissue concerned in a natural condition, increases its size or alters its texture. The morbid growths

thus resulting constitute the principal division of a most important class of surgical diseases, which are named Tumors. The term tumor, implies enlargement of a part of the body beyond its natural dimensions, which may be owing to the effusion or accumulation of fluids, as in hydrocele, the displacement of organs, as in hernia, or morbid growths, as in wens.

Morbid growths include simple enlargements of the natural tissues, such as exostosis—conversion of them into textures foreign to the healthy constitution of the body, such as cancer of the breast—and the development of entirely new formations, such as fibrous tumors. Mr. Abernethy used the term tumor as synonymous with morbid growth, and restricted its application "to such swellings as arise from some new production, which made no part of the original composition of the body."* As this would exclude many important enlargements of natural tissues, which constitute tumors very deserving of attention, the more comprehensive definition that has just been stated seems to be preferable.

Morbid growths occur in almost every part of the body, but the glands and subcutaneous tissue are their most frequent seats. They are very variable in the rapidity and extent of their increase, but, generally speaking, grow quickly in proportion to their size; and other things being equal, usually enlarge most vigorously when their situation is dependent. Anything that irritates, or tends to inflame them, promotes their increase; and opposite circumstances are attended with opposite effects; rest, low diet, cold applications, and leeches, lessen the activity of their enlargement.

When inflammation attacks a morbid growth, it either terminates in resolution or mortification, or leads the way to some of the actions which have been described. But, whatever the action may be, it almost invariably proceeds in a depraved malignant sort of manner, so as to prevent a cure, or any satisfactory termination. Morbid growths deserve great attention, not only on account of the distressing consequences which thus ensue, but also in regard to the deformity and inconvenience which they occasion directly by their presence. They may be removed in three ways, viz: by absorption, mortification, and excision. In order to determine on the choice of these means, and execute them properly, it is necessary to be acquainted more particularly with the different kinds of morbid growths.

Mr. Abernethy's arrangement and nomenclature of tumors are generally adopted. He divided them into Sarcomatous and Encysted; the former being solid; the latter composed of a cyst containing matters of variable consistence.

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* Abernethy on Tumors, p. 6.

VASCULAR SARCOMA.

Of all morbid growths, the simplest and apparently most akin to the natural structure, is that which has been named Simple or Vascular Sarcoma. It seems to be chiefly composed of accumulated cellular tissue and bloodvessels. It sometimes exists as an independent tumor; but more frequently constitutes what are called simple enlargements of natural parts, as the testicle, thyroid gland, or scrotum. It produces little inconvenience, except what proceeds from its size; and is recognized by negative characters; that is, by not manifesting the peculiarities which distinguish the other kinds of morbid growth.

Of all tumors, this is the one which yields most readily to means that promote absorption; and these, accordingly, are chiefly employed in its treatment. Of local applications, blisters and stimulating lotions, with ointments containing mercury, iodine, and the hydriodate of potass are the most useful—more or less pressure being at the same time applied. Mercury and iodine are also very serviceable when administered internally so as to affect the system, care being taken that their use is not pushed too far, so as to injure the patient's health. If the tumor during the treatment becomes red or painful, a few leeches should be applied; and the utmost care is to be taken throughout, that the patient's secretions are duly performed. In this way chronic enlargements of the glands, and simple sarcomatous growths existing independently, may sometimes be dispersed. Should they prove obstinate, and occasion much inconvenience or deformity, the best method of removing them is excision, if the circumstances of the case, as to the situation and connections of the tumor, do not forbid it. Some attempts have been made to arrest the morbid nutritive action or cause sloughing of the mass proceeding from it, by tying one or more of the nutrient arteries; but experience on this subject has hitherto been very limited and unsatisfactory.

Under the head of Vascular Sarcoma may be arranged the excrescences named Warts, and Polypus. The former is a growth from the skin, the latter from the mucous membranes. In both, the natural textures appear to be rather preternaturally extended, with more or less softening and relaxation of the structure, than subjected to any degeneration or morbid alteration of composition. Warts are met with most frequently on the hands, and on the thin skin which surrounds the outlets of the body — as the eyelids, lips, and prepuce. It must be here remarked, however, that most of the excrescences on the face, which are usually designated warts, really possess an entirely different nature, being altogether new formations which have nothing in common with the growth under considera-

tion, except some resemblance of form, and require to be carefully distinguished, since the treatment, which is proper for the one sort, proves most injurious when applied to the other.

Warts admit of removal by the action of stimulants, such as strong acetic acid, or the concentrated solution of sulphate of copper; also by caustic, the ligature, and the knife or scissors. The first and last mentioned means are the best for the purpose — the former being employed when the growth possesses a soft consistence and broad base, the latter when it is firm and prominent.

Polypus is a growth of softer consistence, but varies considerably in this respect according to the part from which it proceeds. The lining membranes of the nose and uterus are its most frequent seat; and next to them the pharynx and rectum may be mentioned. It has usually a grayish-yellow color, and possesses little vascularity, with still less sensibility. The inconvenience caused by its presence is chiefly of a mechanical nature, but, nevertheless, often sufficiently distressing.

The treatment is either palliative or radical—the former consisting in the use of astringent applications, and the latter in removal by evulsion, ligature, or excision. The expression, Polypus, like that of wart, is often loosely and inaccurately employed to denote growths of a totally different character, merely from their occupying the same situation.

FIBROUS SARCOMA.

Under this title may be comprehended the tumors which have been named Fibro-Cartilaginous, Tubercular, and Pancreatic Sarcoma. These growths possess a structure varying in density from that named Fibro-Cartilage by anatomists, to the softer consistence of some glandular textures, as that of the pancreas. They have always a nodulated, or what mineralogists call a botryoidal surface, and a compact homogeneous consistence, with the exception of small cells, variable in size and number; they are of a yellowish or gray color; and are inclosed in a capsule, which separates them from the surrounding parts. They are met with in all parts of the body, but occur most frequently in the vicinity of the parotid and mammary glands, which they compress, and thus cause to be diminished by absorption, so as at last sometimes to occupy their place, and appear to superficial observers a morbid degeneration of the glands themselves. They are seldom attended with any inconvenience except what their size occasions, but sometimes become the seat of uneasy sensations; they are not prone to any other action than that of their own nutrition; and after attaining a certain magnitude, remain stationary, but in the course of time are apt to degenerate.

The only efficient treatment is removal by the knife, and this in

general may be easily done. The incision should be made freely through the integuments, and fairly down to the substance of the tumor; and in detaching the cellular connections, the knife should be directed against the surface of the growth, since it may be cut with impunity, while the neighboring parts, by doing so, are protected from injury.

ADIPOSE SARCOMA.

One of the most common solid tumors is that which has very properly been named the Adipose or Fatty Growth. The appearance of its structure is precisely what the title indicates, and bears the closest resemblance to that of the ordinary subcutaneous fat. It is generally of a somewhat darker, though sometimes of a lighter yellow color, and not so granular; it is surrounded by a thin capsule, which keeps it distinct from the neighboring parts, unless they happen to be pressed together by the patient's clothes or otherwise, when adhesions occur between them; it is generally of a more irregular figure than would be supposed from its appearance while covered by the integuments, and frequently sends out long processes in various directions. The skin covering such tumors is not discolored, but usually shows some inequalities of surface, corresponding with the lobules of the growth. The adipose sarcoma occurs in every part of the body, and at all periods of life, but is most frequently met with under the integuments of the trunk in young females, and middle-aged people of both sexes. There is frequently more than one tumor in the same person. It tends to increase according to the principles already explained, and occasionally attains a monstrous size, so as to weigh ten, fourteen, or even twenty-seven pounds, which was the weight of one removed from the parietes of the abdomen by Sir A. Cooper.* It generally occasions no inconvenience except what is caused by its bulk, but sometimes becomes the seat of uneasy sensations, and weakens, in some way not yet explained, the voluntary action of the neighboring muscles. It is not prone to any morbid action or degeneration, but has in some cases been found altered in this way.

In treating adipose sarcoma, it is found that the means which promote absorption have little or no effect, and that excision is the only mode of affording the patient relief, unless the tumor happens to have a very narrow neck, when the ligature may be employed, but not so advantageously as the knife, since the root or part seated under the skin necessarily remains, and is apt to prove the source of a future growth. The capsule which surrounds the growth hardly adheres to it, except in the circumstance above-mentioned of having

* Medico-Chirurg. Trans., Vol. xi.

been subjected to pressure, so that the dissection is extremely easy and readily performed. The incision should be made freely down to the substance of the tumor, which is then to be drawn outward and detached from the cellular connections by repeated applications of the knife directed upon its surface. The finger-like processes, often sent out on different sides, must be carefully disengaged in the same way from the sort of sheaths, in which they lie, by alternately gently pulling and slightly scarifying them.

CYSTIC SARCOMA.

Tumors are occasionally met with, which, when divided, exhibit a cellular structure, the compartments being extremely variable in their relative as well as absolute size, and in the nature of their contents. Sometimes they are perfectly fluid, at other times viscid or glairy, and their color is of every kind, though most frequently yellow or purple. Different cells of the same tumor often have dissimilar contents. Sometimes the tumor is entirely composed of cysts, at other times a variable proportion of solid substance is interposed between them, and this possesses the characters of fibrous sarcoma.

This Cystic Sarcoma, as it is called, tends to increase, and does not appear to have any limits to the size which it may attain, as may be seen in the case of ovarian dropsy, which depends upon the great development of a cystic structure in the ovary. It is not prone to degeneration, and it occasions very little uneasiness, except by its bulk, causing deformity, impeding the movements of the patient, or pressing injuriously on important organs. It occurs most frequently in glandular structures, especially the ovaries, testicles, and mamma, but is also occasionally observed under the integuments of the trunk, more particularly the upper part of it, and rarely on the limbs. It is recognized by its imperfect fluctuation and color.

The only treatment that this growth admits of with advantage is excision, which is effected with very different degrees of facility, according to circumstances. If the tumor be seated in a texture of limited extent, such as the mamma, it may be very readily removed. But if it commences simply in the cellular texture, it is apt to spread so widely, and contract such adhesions, as to render an effectual operation very difficult, or even impracticable. In such situations, it is therefore the duty of the surgeon to press upon the patient the propriety of early extirpation.

CARCINOMATOUS SARCOMA.

The morbid structure which is designated Carcinoma, is distinguished by its great firmness, and almost cartilaginous hardness, whence it used to be, and still is, occasionally called Scirrhus.

The dense texture which characterizes carcinoma does not constitute a uniform homogeneous mass, but has numerous interstices which are filled with a yellow or brownish-gray friable substance, and it is generally extended in the form of diverging bands which spread into the neighborhood. When the disease occurs in an organ of limited extent, as a lymphatic gland, it does not tend to diffuse itself beyond the confines of the part concerned, the structure of which it affects more uniformly than when seated in a tissue less distinctly bounded. As the disease proceeds, however, it at last breaks through this obstacle, and then spreads as has been already described. The carcinomatous action extends itself in a different way also, namely, along the absorbent vessels and glands of the part originally affected. It would seem in general to take this course more readily than to pass directly from one tissue to another. As to the mode in which the morbid action is transmitted along the absorbents, there exists a difference of opinion, some thinking that matter must be conveyed through the vessels, others that the mere irritation of the disease, propagated along the coats of the lymphatics, is sufficient to account for the sympathetic affection of the parts in question. The fact is certain that glands, in the course of the absorbents leading from a carcinomatous tumor, are often thoroughly tainted, though the original mass remains solid, and contains no fluid matter in its interstices.

Carcinoma occurs most frequently in glandular or secreting structures, and the mamma, lips, skin, tongue, stomach, and uterus, may be mentioned as its most common seats. It seldom commences in people below middle age, and from forty to fifty may be mentioned as its favorite time of attack; but it is occasionally observed in persons much younger than this, even in those who are not more than twenty or thirty. I am not aware of its having been ever met with before puberty. The predisposition of parts to carcinomatous action seems to be increased by their suffering chronic enlargement and induration; and the disease is generally called into existence by some irritation either direct or indirect. Of the former, blows and bruises may be mentioned as those most frequently concerned, and of the latter, suppression of habitual secretions. The cessation of the menstrual discharge, though a natural event, almost always occasions more or less disturbance of the system, and this occurring at a period of life when, other things being equal, the tendency to carcinomatous action seems to be strongest, has been thought to exert great influence in exciting the disease. The disposition to the morbid action is sometimes so strong, that it begins without any local cause, and is then apt to occur in more parts of the body than one. The patient usually betrays the unhealthy

tendency by a peculiar greenish-yellow complexion, and anxious expression of countenance.

The characteristic symptoms of carcinoma are hardness and pain. The hardness exceeds that of any natural texture, except bone and cartilage. The pain is usually of a lancinating or darting kind, not constant, but attacking the patient by fits. Sometimes it is described as hot or burning, and is then usually more fixed.

Carcinoma tends to inflame and ulcerate. If the skin is affected, this takes place on the surface, in which a breach opens, and gradually extends. If the disease be more deeply seated, an abscess is formed within it, which discharges its contents, and leaves a cavity ready to take on the same sort of action as the ulcer which is established in the other way. In both cases the ulcer makes no advance toward reparation, but proves truly specific and incorrigible, and is named a Cancer. The process is occasionally reversed, the morbid formation taking place round a sore, which, in the first instance, does not present any malignant characters. The base and edges of the cancer are of course extremely hard, since the excavation is formed in a carcinomatous mass. The ulcer is very irregular in the shape of its margin and surface; sometimes it is deep, and as if scooped out of the part; at other times, cauliflower-looking excrescences rise from it, and hang over the edge. The discharge is generally profuse, bloody, and fetid. The pain is usually incessant, and of various kinds, but sometimes gives very little trouble. The patient loses appetite and sleep; complains of wandering pains and weakness of the limbs; becomes gradually exhausted; and at last dies, in general rather suddenly, before the period which might have been expected from the progress of the disease. The rapidity of its course varies greatly, a few months being sometimes sufficient for its reaching a fatal termination; while in other cases it exists for years with little change, or even remains stationary altogether.

The treatment of carcinoma in its different stages has engaged more attention than perhaps that of any other surgical disease; and it has been repeatedly believed that means of correcting the morbid action were discovered. More careful observation has uniformly proved these expectations to be fallacious: and it must be admitted, that, so far as we know at present, there is no cure for carcinoma except extirpation. Much may perhaps be done in the way of prevention, by protecting those parts of the body most subject to the disease from the influence of irritation, at that period of life when the disposition to it exists most strongly; and leeching, with fomentation, in most cases, not only alleviates the severity of the symptoms, but retards the advance of the malady. Tranquillity of

body and mind, regularity in the secretions, and moderate diet, conduce to the same effect. The pain of cancer may be soothed by opiates, used both externally and internally. Hemlock poultices, lotions, and ointments of acetate of lead, carbonate of iron, various preparations of arsenic, pressure, and an endless catalogue of applications might be mentioned, as having been more or less confided in for correcting the diseased action, and instituting a healing one. They sometimes afford temporary relief, but *never* effect any permanent alteration to the better. The only proceeding that deserves at all to be considered a remedy for carcinoma, is removal of the morbid structure.

This may be done sometimes by the actual or potential cautery; but these means are very apt to destroy the disease only partially, and consequently do no good, but, on the contrary, harm, by exciting greater activity in the portion that remains. The knife or scissors effect the extirpation most easily and securely; and the ligature should be reserved for those cases where excision might be attended with irrepressible hemorrhage. It would be subjecting the patient to useless pain, and bringing surgery into discredit, to attempt extirpation in cases where the extent or connections of the disease prevented its complete removal. It is also incumbent on the surgeon to search very carefully for glands in the course of the absorbents, that may have become affected, since it appears that the result of operations for carcinoma, when the glands are affected, is almost invariably unsatisfactory, however perfectly they may seem to be taken away. The reason of this probably is, that the glands do not participate in the disease, unless the system be strongly disposed to it, and consequently their removal, however freely and effectually executed, cannot prevent the patient's relapse. In performing the operation, it is not sufficient to take away the mere indurated mass, as the surrounding parts are always more or less vitiated in their disposition. If the disease is seated in a distinct organ, the whole of it ought always to be removed, however small the part of it which is actually affected may be; and when the tissue concerned is not in this way circumscribed, the knife should be carried as wide as possible from the tumor.

[I shall introduce, in the body of this work, a chapter specially treating on cancer, in which will be embodied the different essays of Prof. Syme upon the subject. I shall show, that in the treatment of this form of disease, he is not up to the improvements of the age.—R. S. N.]

MEDULLARY SARCOMA.

The title of Cerebriform is perhaps more correct than that of Medullary, to designate the species of sarcoma which is now to be considered; but as the general acceptation of the latter term has fully

sanctioned its use, there would be no advantage in attempting a change.

The medullary growth bears a close resemblance to the substance of brain, not only in appearance, but also in clinical composition. When divided, it seems as if composed of irregular masses, inclosed and separated from each other, more or less, completely by thin membranous septa, which become more obvious after the soft pulpy mass is removed by maceration, or the action of alkalies. The consistence of the tumor, though in general pretty nearly that of the brain, is sometimes much denser; at other times, more approaching fluidity than the natural state of this tissue. Its color also is subject to much variety, from almost pure white to the darkest red—the difference in this respect seeming to depend on the quantity of blood which circulates through the growth, or is effused into its interstices. The proportion of blood is sometimes so great, that the tumor, when divided, resembles a coagulum; but more frequently it exhibits merely spots or blotches, irregularly interspersed through the substance of the mass.

Occasionally, but not frequently, this morbid growth appears in the form of a cyst, the parietes of which, though of little thickness, are composed of the cerebriform structure, while the cavity is occupied by clear serous fluid, usually of a greenish color. It is then apt to be mistaken for distension of a bursa, or an abscess; especially as the most common seat of the disease in this form is the upper and inner part of the thigh.

Medullary sarcoma may occur in any tissue of the body, but originates most frequently in the bones, testicle, mamma and eye; next to which the subcutaneous cellular texture, brain, and lymphatic glands, are the most common seats of its commencement. Like carcinoma, it extends itself both into the neighboring parts and along the absorbents; but spreads in the former more readily than in the latter direction, which is the reverse, as has been already stated, of what happens in regard to the other disease. It occurs at all ages, but is most frequently met with in infants, and adults between twenty and forty. It is recognized by its soft semi-fluctuating consistence, which is sometimes very apt to make the swelling be regarded as depending on the presence of a fluid. The superficial veins become very much enlarged; but as they do so, though hardly to the same extent, in nearly all chronic enlargements, this diagnostic mark must be considered merely as a corroboration of the more positive evidence which is afforded by the consistence, situation, and history of the tumor. The pain that attends it, is extremely uncertain—being in some cases very severe, in others hardly perceptible.

This morbid growth, after attaining a certain size, tends to open and protrude the soft substance composing it. It does so by sloughing, the

formation and evacuation of an abscess, or simply ulceration. In whichever of these ways the bursting, as it is called, takes place, the integuments covering the tumor first become red and adherent, then the breach is established, the substance of the tumor presents itself to view, and fungous excrescences usually shoot out from the cavity. The discharge that ensues is always profuse, and generally very thin, excessively fetid, and occasionally bloody. In some cases, pure blood is effused, from time to time, in considerable quantity; and hence, Mr. Hey, of Leeds, who first gave a general description of the disease, named it *Fungus Hematodes*. This term cannot be applied with propriety, and leads to much confusion, because the fungous protrusions of medullary sarcoma do not always, or even generally, bleed, while a bleeding fungus may appear without being preceded by the medullary formation. There is nothing particular in the structure of such bleeding excrescences; and if the term *fungus hematodes* be retained, it should have its use confined to express simply the fact of there being a fungous protrusion from which blood issues.

Medullary sarcoma, in its advanced stage, is attended with a greenish-yellow complexion and general emaciation. If allowed to proceed, it sooner or later destroys the patient by gradual exhaustion. The rapidity of its course, like that of carcinoma, is extremely variable, and cannot be foretold, according to any data with which we are as yet acquainted. The treatment of this disease is, if possible, still less satisfactory than that of the one first mentioned. All local applications and internal remedies are admitted to be totally useless. The only mode of affording relief is excision; and, owing to the tendency of the morbid action to diffuse itself into the neighboring parts, whatever be their nature or texture, as well as the taint, or unhealthy disposition of the system, leading to its appearance in different parts of the body at the same time, the operations for this purpose are very often followed by relapse. Unless, however, the case does not permit complete ablation of the tumor, or there should be indications of the disease existing in other regions of the body, or the pulse is quickened by the local irritation, in which case, so far as I have observed, recovery never follows an operation, it is the duty of the surgeon to give the patient the benefit of the chance that is thus afforded; and, of course, the sooner that this is done the better, after the nature of the malady is ascertained. The prospect of permanent relief seems most favorable when the disease is seated in the testicle and bones, and most hopeless when the eyeball is affected.

Nearly connected with this kind of growth, is that which has been named Melanosis. The title was applied by Laennec to tumors possessing the same soft brain-like structure, but differing in regard to their color, which, instead of being white, was either green, or inter-

spersed with red, dark-brown, or black. In other respects, the diseases resemble each other so closely, as hardly to require separate designations—affecting the same parts, following the same course, and requiring the same treatment. It may be remarked, however, that the morbid tendency, as shown by extension, reproduction, or simultaneous formation at distant parts of the body, is not, in general, nearly so active in the melanotic as in the ordinary form of cerebriform sarcoma, and that the prospect of benefit from removal by operation is consequently not so unfavorable.

SCROFULOUS SARCOMA.

The morbid formation usually called Scrofula, presents different appearances, according to the tissue affected. In general, it constitutes rounded masses or tubercles, as they are named, which consist of a grayish-yellow, gritty, semi-organized-looking substance. It sometimes is not condensed and circumscribed in this way, but exists in a diffused state, so as to produce more or less change in the structure concerned. In the bones, it is confined to the cancellated texture, the interstices of which it fills; in the synovial membrane, it produces a remarkable thickening, softening, and conversion into a sort of gelatinous consistence; in the lungs, lymphatic and mesenteric glands, subcutaneous tissue, brain and *dura mater*, it occurs in the tubercular form. It is not attended with pain, and hardly produces any inconvenience, except by its bulk causing deformity, or pressing injuriously on important organs.

The morbid formations generally remain stationary for a longer or shorter period after their completion, and then are either absorbed, or, as more frequently happens, suppurate, so as to constitute abscesses, containing thin sero-purulent fluid, with flakes of scrofulous matter or lymph floating in it. When the matter is discharged, the restorative process advances slowly and imperfectly; indolent sinuses or weak ulcers almost always result; and owing to the situation of the disease, or the nature of the tissues affected, as may too frequently be seen in regard to the lungs and bones, a cure is never accomplished.

The disposition to scrofulous action exists most strongly in childhood, from two to fourteen years of age; but traces of its effects are sometimes observed much earlier, and it would be difficult to prove that its operation does not occasionally continue in the most advanced age. The morbid tendency is chiefly inherited as a peculiarity of constitution, and is usually associated with light hair, blue eyes, a fine skin, and florid complexion; whence scrofulous children often appear very healthy and thriving until they begin to suffer from the effects of their peculiar disposition. The earliest external indications of its presence are, in general, swelling of the upper lip and *columna nasi*,

with tumefaction of the edges of the eyelids. Many exceptions occur in which all these signs are wanting, and the patient, though of dark complexion, and exhibiting in other respects characters quite the reverse of those just mentioned, betrays the strongest tendency to the disease.

The scrofulous diathesis or constitution is not always equally well marked in the parents and their offspring; its effects at least are much modified by circumstances. Whatever has a weakening influence upon the individual seems to increase the morbid tendency. Youth or sickliness of the parents — bad nursing — unwholesome or deficient food — and especially cold, with moisture, may be particularly mentioned as causing or contributing to this effect; and some people have gone so far as to suppose that they may be sufficient to induce scrofulous action without any hereditary taint. This is not fully made out, but there can be no doubt that, though the tendency in the parents be strong, it may be weak in the children, provided the circumstances which have been mentioned are absent, and *vice versa*. Persons who possess a scrofulous constitution are generally more liable to other diseases, and suffer from them more severely than those whose systems are more healthy in their disposition. It is usual to name all these affections scrofulous when they occur in such circumstances, and hence great confusion continually arises. In order to avoid this, it will be better to restrict the use and signification of the term to those diseases which consist in, or proceed directly from, the morbid depositions which have been described as the result of scrofulous action.

[In the common sense of the word, I do not admit any disease to be hereditary. The liability to a great number of diseases may be impressed upon the child by the parent, but that the disease itself is actually transmissible, is a great error, and it shows a willful ignorance on the part of those who teach such a doctrine. I have heretofore used the word "predisposition,"—liability seems to be a better expression. Now a liability to tuberculous or phthisical disease is dependent on the organic *form* impressed upon the child. The disease may be developed or not, as the circumstances are or are not favorable to its development. If scrofula is hereditary, in the full sense, *all* children of scrofulous parents should die of tubercle. It is admitted, on the other hand, by even the advocates of direct transmission, that it may be acquired from circumstances; circumstances therefore have much to do with its development.—R. S. N.]

In the treatment of scrofula, the first object should be to obviate the circumstances which cherish the hereditary disposition. The child should be carefully nursed, warmly clothed, and supplied with a moderate allowance of wholesome nourishing food. If necessary, mild means should be used to correct derangement of the intestinal secre-

tions, but nothing is more injurious than to keep up incessant irritation of the canal by frequently administering purgative medicines, the necessity for which may almost always be advantageously superseded by proper regulation of the diet and exercise. Should the indications which have been mentioned, or the parentage of the patient, lead to the persuasion that the disposition to the disease is very strong, the place of residence, if cold and moist, ought, if possible, to be changed for one that is dry and warm.

When the scrofulous depositions are actually formed, the greatest care must be used to guard against the operation of all direct and indirect irritations, which might tend to excite their inflammation or suppuration. The means proper for this purpose depend on the part of the body affected, and will be explained hereafter; but on all occasions it is right to attend to the climate, the regimen, and the secretions of the patient. Of local applications, iodine seems to have most power in causing absorption of scrofulous tumors. Blisters, muriate of ammonia, camphorated mercurial ointment, pressure, and sea-bathing are also very useful in conducing to the same effect. But it should be carefully recollected, that the exciting influence through which they prove beneficial, if not duly regulated, may occasion inflammation and suppuration. When the abscess is seated in a part of the body exposed to view, as the neck, it becomes important to determine what mode of treatment will render the resulting cicatrix least observable. Sir A. Cooper strongly recommends a small puncture to be made with a lancet so soon as any matter is formed, and that then the remaining scrofulous substance should be squeezed out. The result of many trials leads me to conclude, that it is seldom if ever possible in this way to effect evacuation completely. And what seems to be the safest practice is to let the matter be very fully formed before opening the abscess, when a free incision should be made; or to abstain from evacuation altogether and trust to absorption. If this should not take place, a spontaneous aperture will occur, and may be enlarged if necessary. Various drugs are used empirically under the specious pretext of producing a gradual improvement on the patient's constitution. The muriate of lime is one of these; and there are people weak enough to believe the assertion, that it sometimes requires several years to effect any salutary change. Such practice is merely a cloak for quackery, and as such, is not less useless to the patient, than disgraceful to the profession. It was formerly believed that a miraculous power of curing scrofulous diseases, by simply touching the patient, belonged to the kings of England from Edward the Confessor downward, whence the common name of the disease still in use, viz: the King's Evil. The ceremony was performed at the commencement of summer, during which season there

is a strong tendency to spontaneous recovery; and this may account so far for the reception of a superstition so absurd.

[I neither believe in the surfeiting plan adopted by some to keep up the patient's strength, nor again to the low diet of others. A scrofulous patient, if young, may be cured, or greatly benefited, by supplying a sufficient quantity of such food as will manufacture blood of the very best quality. Such patients are almost always supplied with very poor blood—blood in which the red corpuscles are greatly deficient; and in our plan of treatment, we should be careful to administer such agents as tend to its correction. The vital force and the blood are mutually dependent, and as both are deficient in scrofulous patients, it is our duty to pay attention to both conditions. Tonics, both vegetable and mineral, together with such alteratives as do not thin the blood, may be used. I am partial to the administration of phosphate of iron as a mineral tonic; to the hydrastin and rhusin as vegetable tonics; and to the podophyllin, phytolacin and xanthoxylin, in combination, as alterative agents. The compound sirup of styllingia is also a valuable alterative.—R. S. N.]

ENCYSTED TUMORS.

Encysted Tumors, or Wens, as they are called when of a large size, consist of two parts: 1. A bag or cyst of variable thickness, whence they have their title; 2. A quantity of fluid, semi-fluid or solid matter forming its contents. They are distinguished, in reference to the nature of their contents, into meliceritous, atheromatous and steatomatous, accordingly as they possess the consistence of honey, putty, or lard; steatomes often contain, mixed up with the lardy-looking substance, a quantity of hairs, which seem to grow from the inner surface of the sac.

Encysted tumors are of all sizes, but generally between those of a pea and walnut. They are mostly seated immediately under the skin or mucous membrane, and chiefly abound in the head and face. They are also met with about the organs of generation, but not nearly so frequently, and still more rarely over the limbs. It has been supposed that they are mere overgrowths of the natural sebaceous follicles or crypts, which lie in the skin; and Dr. Sharpey has made known to me a curious observation, which would go to support this opinion—viz: that the substance, which may be squeezed out of the follicles in question, contains numerous small hairs, which can be readily seen through a microscope of moderate power. In some cases, the cyst is obviously of this origin, having an aperture in the skin of a size proportioned to its own; but these cases must be regarded as exceptions, and the completely subcutaneous position, the occurrence in the ovaries and elsewhere, not in the neighborhood of sebaceous follicles, and the usually

entire, imperforated cysts of these tumors, afford good reason to regard them as altogether new formations.

Encysted tumors are sometimes, but very rarely, absorbed, and local irritation, as that of a blow, especially when it ruptures the bag, occasionally excites the action which effects their removal in this way. More frequently they remain stationary after attaining a certain size, or gradually enlarge, adhere to the skin, inflame, suppurate and open. A foul intractable sore then results, and occasionally a growth proceeds from it, taking the form, appearance, and structure of a fibrous horn.

When the tumor inflames, the surrounding cellular substance becomes engaged, and diffused swelling, occasionally of large extent, ensues, attended with severe pain and constitutional disturbance. In such circumstances, a free crucial incision should be made through the affected part, and then a poultice be applied until the sore granulates.

The best remedy for encysted tumors, in their ordinary condition, is excision, unless the cyst is so situated or adherent that it cannot be completely taken away, as in the inner surface of the eyelids, or under the tongue, in which cases the part that remains must be touched with caustic, and left to slough off, or be removed by the absorbent action of the vessels. When the tumor is seated under the scalp, its cyst generally adheres so very loosely, that the operation may be performed almost instantaneously, and with extreme facility, by running a knife through the long direction of the tumor, so as to divide the bag and superjacent integuments, and then pulling it away with forceps, or turning it out with the handle of the knife. If the tumor is large, and has been subjected to pressure, the skin usually adheres to it at the most projecting part; and when this is found to be the case, an elliptical portion must be removed, so as to include the conjoined integument and cyst. In other parts of the body, the bag usually adheres by its whole surface to the surrounding tissue, and must then be either regularly dissected out, or, if small, punctured, emptied and touched with caustic.

[It is sometimes the custom to endeavor to dissipate these and other tumors, by stimulating lotions, etc.; but the plan, except the tumor should be where excision is impossible, is a bad one. No matter how often they may be dissipated, they must be eventually removed with the knife. Every attempt at dissipation only fixes them more firmly, and causes their excision to be attended with much more difficulty. When we consider how easily these tumors are removed, it seems that dissipation is seldom or never warranted.—R. S. N.]

GENERAL OBSERVATIONS ON TUMORS.

Though a very large proportion of the tumors met with in practice may be readily referred to one or other of the kinds that have now been described, it must not be supposed that the characters and disposition are always distinctly marked. Various combinations and gradations of structure, as well as properties, frequently present themselves, so as to render the diagnosis difficult and uncertain. In general, however, it is still possible to determine the predominant features, and accordingly form a correct opinion as to the nature of the disease. But tumors also degenerate or change their condition, in respect both to substance and action. Thus fibrous growths, after remaining for many years firm, circumscribed, movable, and devoid of pain, may become partially or completely softened, confused with the surrounding textures, fixed in position, and the seat of uneasy sensations. Similar changes are observed in the cystic, vascular, and even adipose growths. It would hence be often difficult to recognize the original nature of tumors presented in practice; but this is of little consequence, since, whatever it may have been, the existing characters must regulate the opinion and practice. Thus, as already stated, fibrous growths may, for a long period of years, retain their simple unoffending nature, together with its characteristic features, and at length undergo a change so as to assume the condition of cerebriform tumors, when they are found to constitute no less unsatisfactory subjects of treatment than if they had originally possessed the same malignant disposition.

This degenerating process sometimes occurs in a reproductive form, as is observed in the case of a tumor not unfrequently met with in both sexes, at the time of life when youth is passing to maturity, and also, though more seldom, at both earlier and later periods. It generally occurs on the trunk, and especially on the dorsal region. The structure is usually white and somewhat fibrous looking, but sometimes can hardly be distinguished from the adipose formation, from which indeed it has been found to differ only in having a slight admixture of cellular substance, rendering it more white and firm. There is at first no pain or other unpleasant symptoms, and the patient usually retains good general health. The operation for removal, in these circumstances, is readily undertaken, and executed without any difficulty, or immediate bad consequence. But very soon after the wound is healed, another growth, or, more frequently, several of the same kind, appear in the neighborhood; and if these be removed, they are speedily succeeded by new productions, of which the consistence is harder or softer, the enlargement more rapid, and the distinction from neighboring parts less complete. They also become painful and inclined to ulcerate and fungate, and finally prove fatal to the patient.

In the case here represented (Fig. 4), there were two tumors, one lying in the groin, the other enveloping the left testicle, and extending into the perineum. I removed them both, and from the perfect characters of the adipose growth which they presented, augured favorably of the result, notwithstanding their deviation from what is usually observed in regard to tumors of this kind as to situation and form. The wound healed very speedily, but the patient returned at the end of two years with *four* tumors occupying the same region, but possessing a larger size, as well as firmer consistence, and more intimate connection with the neighboring parts. I then recognized the nature of the disease, and declined any farther interference. It would be difficult to assign the proper place for this tumor in a systematic arrangement of morbid growths, and still more so to lay down any certain diagnostics of its presence; the issue of an operation being the only means of recognition hitherto determined. Could its nature be ascertained previously, of course no proceeding of this kind should be adopted, since the irritation attending it evidently accelerates the morbid process.

Fig. 4.



In examining tumors with the view of ascertaining the nature of their structure, some practitioners are wont to explore their substance by introducing into it a flat needle, plain or grooved, to permit the contents, if fluid, to escape: and there may occasionally be so much difficulty as to warrant this practice. But in general, all such liberties should be carefully avoided, as useless and dangerous, from their tendency to excite the morbid disposition of the part.

[These tumors, to which Professor Syme does not venture to add a name, are the "Fibro-Plastic" of Lebert, and the Recurring Fibroid of more recent authors. They are evidently a degeneration from the true Fibroid Tumor, and merit the utmost attention. Generally they are more perfectly organized than the true fibroid tumor, but each multiplication becomes more malignant. It is for this reason that operations are always to be avoided in reference to this tumor. Several cases occurred in my earlier practice, in which I consented to excise them, partly from the entreaties of patients, and sometimes because

their true nature could not be well determined; and in every case there was an increase not only as to number, but in malignity. It is not always, indeed very seldom, the case that their real character can be determined even after the excision has been performed, unless inquiry be specially instituted for that end.—R. S. N.]

CHAPTER VIII.

CANCER.

ITS PATHOLOGY AND TREATMENT.

[Without circumlocution, I proceed at once to the description of Cancer, since, in the ten pages which I shall devote to this subject, the reader could hardly expect me to enter into either a bibliographical review of the subject, or into a detailed history of every variety of cancer, or every mode of treatment which has been empirically tried for its radical cure. Information of this kind must be sought in works treating specially on cancer. I desire only to present my own views to the profession—and as it is generally known, at least throughout the south and west, that I have been very successful in treating this terrible affliction, I hope others of the profession will adopt a similar plan of treatment.

For the purposes of this chapter, I shall consider scirrhous, medullary, epithelial, calloid, osteoid, melanotic, villous and hæmatoid cancers as arising from one common cause. It is very true that the resulting growths may vary as much as bone and muscle, as much as fat and the strong tissues of the heart, as much as hair and the hepatic gland.

Every well-informed physician is perfectly aware that there is no such thing as nutrition for the body except through the instrumentality of the blood. For its character, the blood will depend upon the kind of material furnished through the function of digestion, and the condition of the lungs and excretory apparatus in general. All the tissues of our bodies depend upon the material floating in the plasma for their growth. Physiology and physics show most conclusively that heterogenous particles float along side by side through artery, vein and the most minute osseous canals; that at one point this atom will be deposited, at another that, and so on *ad infinitum;* and also, that while these depositions are being made, the same cur-

rent is taking up and bearing along to points of elimination particles corresponding to those which had been appropriated, but which are now worn out and must pass through a series of descending metamorphoses preparatory to their final ejection from the system. It is well known that in any process of change, either in the ascending or descending grade, there may occur new or independent formations. These formations are the result of decomposition, caused by some mechanical injury or the obstruction of the depuration of a part. In no case, however, has cancerous formation or cells ever been found circulating in the blood, where cancer did not exist in a softened or suppurating condition. This proves conclusively that it cannot originate primarily in the circulation.

When we have divided and closely examined the structure of a great number of cancerous growths, we find that they show four great classes, each of which has its varieties and modifications. These, I shall denominate: 1. Scirrhous; 2. Medullary; 3. Epithelial; and 4. Mixed. The last class embraces very many classes as shown in the books; such as melanoid, hæmatoid, osteoid, villous and calloid, which, while they differ from each other, are, in many respects, too much alike to be formed into separate classes, which could only tend to envelop the subject in more confusion than at present.

Each of these four classes is distinguished by its peculiar cells, which of course may retain their general characteristics, while they assume a variety of forms; *e. g.*, in the scirrhous or hard cancer the great majority of the cells are nearly round, while some have handles, or tails, or angles; some are scimitar-shaped, some villous, and others again are perfectly oval. The cells differ in *shape* in the scirrhous cancer in different persons, and in different localities; yet they all have their well marked nuclei, and their general appearance when examined with a good glass, is so constant, that we have no trouble in recognizing them at once as those of scirrhous cancer. In size, they range from the one eighteen hundredth of an inch to the one seven hundredth of an inch in diameter. The most common size, however, is about the one thousandth of an inch. As these cells exist in the cancerous growth, they somewhat resemble the common secreting cells of glands; they are clear and almost pellucid at first, but rapidly change when water is placed on them, becoming somewhat granular, and dotted here and there with minute molecules. The walls of these cells are extremely thin. It is also held by some eminent authorities that these cells at best are only soft masses of tenacious matter, containing nuclei within them. Be this so or not, I do not see reasons for adopting the theory so rashly advanced, and if it can be proven, it still will not militate against the opinions I have already formed of their nature. These cells may, and often do break up, leaving only

the nuclei to maintain a separate existence; or, they may pass into fatty degeneration—both of these events nearly always occurring. Let me here remark, that any variety of cancer will be greatly modified by the tissue and locality in which it occurs.

In medullary or encephaloid cancer we mostly find the great mass to be composed of molecular matter, in which the typical cancer cell is found to be imbedded. There are found also great numbers of free nuclei which assume an indefinite variety of shapes—often hair-like, or in strips, like ribbons, and, in fact, very often having the appearance of true animalculi. The cell of this class of cancerous growth is usually from one eighteen hundredth to one three thousandth of an inch in diameter. The specimens examined will differ very much—in some the cells will be scattered loosely, while in others they will be imbedded closely together, forming quite a solid mass—in appearance either like a raspberry or mulberry, except in color. When separate, and after having assumed their most fantastic shapes, they differ from the cells of the scirrhous cancer, more in shape than otherwise—the nucleus generally being in the middle, forming a body, while the two ends or tails either split up into fine shreds, or take on a contorted form, each one being different from the other.

The cells of the epithelial cancer are larger than either of the varieties already described; they are less nucleated and more scale-like. The numerous shapes of the cells of this class of cancer are so well defined, that most authors have given separate names to each, but as this course is out of all reason and totally unjustifiable, I pass them without further notice in this connection.

The cells of the mixed class of cancer are so varied and numerous, that I should only lead the reader into confusion by describing them. The varieties and modifications of cancer of which the class is composed, are themselves so very numerous, that I have thought advisable to throw them into one class; and since the treatment for them is the same, I see no objection to the plan.

Everything of which a cancer is composed, is a new formation. It is true, we may cut down into one and find fatty tissue, etc., but these will soon be changed to cancerous matter by the processes of degeneration. I am aware that it has been held that natural textures cannot be changed to cancerous matter; but it seems to me that no proposition is easier of demonstration than that the most healthy textures may be readily changed into cancerous. We all know that when a cancer has began to run, the surrounding parts are soon absorbed and the cavity greatly enlarged. It is admitted by Mr. Paget, "that it is possible that in the mutation of structures effected in the nutrition of certain parts, the elemental structures successively formed may gradually assume the appearance and properties of those of

cancer;" and as Mr. Paget is high authority, I shall pursue this question no further.

Again, there is a mode of development of cancer which ought not to be overlooked at this place. It is this: When cancer has been formed and suppurates, it is abundantly filled with loose nuclei; these may be taken up in the circulation, and be deposited in some distant gland, when, if that gland shall be bruised or otherwise diseased, these loose blastema take root, as it were, and soon grow into true cancer. It is in this way only, that we are enabled to explain the occasional plurality of cancers in the same person at the same time.

Cancer is a separate and independent disease *per se*, having nothing in common with other tumors.

The true cancer structure when developed, may be generally described as a compound of nucleated cells or corpuscles which have degenerated from those cells. The cells are not imbedded in intercellular tissue, nor are they arranged with the same order as other cells. These facts belong exclusively to cancerous growths. These cells, molecules and matter of degeneration, are not held together by a true connective tissue, but by something very akin to it, which we term *Stroma*. Upon this stroma depends the compactness and solidity of the cancer. In some instances it is so abundant, as to give it a very peculiar and fibrous appearance; and in others, it is so sparingly supplied, that the cancerous mass seems as though it would fall to pieces.

Throughout the entire cancerous mass there is found a great number of bloodvessels—some being those natural to the part, while others are formed as the cancer cells, and nourish the cancer with all those elements which serve to build up its morbid structure, by conveying from part to part the new germs coming in, or which are being set free by the cells themselves at some particular point. They constantly enlarge and magnify, until the entire mass often has a tinge of red. No pathologist has yet been able clearly to explain the nature of the process by which these canals or tubes—bloodvessels—are formed in the cancer mass, and the *theories* which have been advanced, are certainly very far from being satisfactory. From the enormous caliber of many of these vessels, they have been spoken of as "colossal capillaries." The bloodvessels of the placenta are, perhaps, the best types we have of them.

Cancers, thus formed, are found upon every part of the body, more frequently in the uncovered parts, however; or where the parts are liable to rubbing, bruises, etc. They present every variety of form and consistence, some being exceedingly loathsome, while others for a long while appear only as ordinary tumors. They attack at any age, but most commonly after middle life. They invade every structure of the body; they bury into bone and soft tissue; they eat inward

and outward; they poison the blood, distract the mind, and call forth every human sympathy. They stop not in the hovel to feed on the filth of poverty and want; but they go also into the palace, and consume the body of the king or the queen. The old and decrepid do not alone have to shrink from its embrace; but the young, the beautiful and the gay must often bow to its fatal grasp. In all ages the disease of cancer has been justly held to be one of the most terrible; aye! the most terrible—for while the plague sweeps the patient into the presence of his God without warning, cancer is a slow and insidious sore that gnaws away at his vitals day after day, and week after week, until the body has been consumed.

Ever since medicine has been cultivated as a distinct science, surgeons and practitioners have been seeking a specific or general treatment for the disease. Almost every article of the Materia Medica has been used in its treatment. But the failure is so very palpable, that long since the profession has concluded and declared that the disease called cancer is incurable.

Experience has also shown that the knife fails, and that most lamentably—for a very large proportion of those who have cancers excised alone, do not live as long as they would had there been no operation for the removal of the diseased growth. Not long since, an able surgeon declared before the American Medical Association, that he had operated in over eighty cases, and that of the whole not one recovered. This is a powerful argument against the knife, although it is constantly corroborated by our every day experience, where the knife has been used. We have examples of failure of the knife constantly thrust upon our observation; yet a very large proportion of the surgical profession still adhere to its use, and, in the face of facts, contend that it is the only hope for those who have cancerous affections. They have seen cures performed by local applications and caustics of some sort or other, and so unwilling have they been to admit the facts, that they have either denied the malignancy of the cancer, or else they have asserted that the knife had been secretly used.

But irrespective of opinions, pro and con, I proceed to the illustration of the plan of treating cancers adopted by me. I select a few out of over four hundred cases.

Case I.—Mrs. Griffin, the wife of an eminent citizen of Cincinnati, applied to me for a cancer of the right mammary gland. The profession here had examined it, and pronounced it incurable cancer. With the sulphate of zinc I removed every vestige of the gland, and sloughed it off by elm poultices, effecting a perfect cure, as the lady still resides in this city, though the cancer was removed over ten years ago.

Case II.—Mrs. C. P. Bolton, of Indiana, came to this city to have her hand amputated for epithelial cancer, which the best surgeons here had told her was an inevitable result. Before submitting to amputation she came to me. I examined it, and told her it was curable. The cancer occupied the palm of the hand, and was just bursting through on the back of the hand when I commenced treating it. I removed the fungus by the use of the chloride of zinc, and soon effected a perfect cure—the lady now having the use of her hand, eight years after the application of the zinc.

Case III.—Mr. Wm. Adams, of Harrodsburgh, Ky., came to consult me for a cancer on the cheek. It was about as large as a half dollar. I applied the chloride of zinc, and sloughed the parts with the elm poultice. In a few weeks, he returned perfectly cured, and so remains.

Case IV.—Robert Forsyth, of the same place, also came to consult me for a cancer on the face, which I cured as in the case of Mr. Adams.

Case V.—Capt. S. M. Barner, of Smithland, Ky. Capt. Barner is a gentleman known from Pittsburgh, Pa., to New Orleans; and after the cure of cancer, with which he was affected, he addressed the following letter to the editors of the Cincinnati Daily Commercial:

Broadway Hotel, *Cincinnati*, *Dec.* 6, 1848.

Mr. Curtis:—*Sir*—I have concluded that my case (being cancer) might be of interest, at least to those suffering as I have been. I desire, therefore, to communicate the same through the medium of your widely circulated paper, hoping that it may attract the attention of those for whom it is intended. For many years I have been suffering with what my physicians called Cancer. It was located on my right eye and temple, filling up the entire portion between the eyeball and the bone or socket of the external canthus of the eye, including both upper and lower eyelids, and extending toward the temple. For many years it caused me much pain and uneasiness. At times it would heal over, and appear well; but this was only for a short time, and for the last two years it required to be dressed every day, without a single exception. I have consulted in and from the city of New Orleans to Pittsburgh, more than one hundred physicians; they all expressed to me the opinion, that it could not be cut out, owing to its peculiar situation; and, as there was no other way that cancer could be cured, I must rely on palliatives only, and trust to Providence for the result. They advised the solution of caustic and dry calomel, etc., which I continued to use until the disease became entirely unmanageable, with these or any other plan of treatment that they could suggest.

At last, from reading a notice, in the Louisville Medical Journal,

of a case of cancer, reported by Dr. Daniel Drake, as having come under his care, but was by him pronounced incurable; also Dr. L. S. Rives, of this city, giving the same opinion; and that afterward Dr. R. S. Newton cured the same case; and learning also that this as well as many other persons had been cured by him, and are yet well, I was induced to consult Dr. Newton, and put myself under his treatment. I did so, and he has cured me in one month, and that too without the KNIFE. He removed the entire diseased structure, and healed the place from whence it was removed, and now I am once more a well man. I leave for my home and family this day. My address is Smithland, Ky. Yours, S. M. BARNER.

Sometime afterward, Capt. Barner addressed me a note, from which the following extract is made:

SMITHLAND, *January* 11, 1849.

DR. R. S. NEWTON:—*Dear Sir*—I returned home a few days since from the South, and take the first opportunity of writing you. Since I left you, in the early part of December, my eye, from where you removed the cancer, has continued to improve, and is now entirely free from inflammation or weakness, and no scar is visible except to my family, and only to them by the nearest scrutiny; the hard substance that seemed to be left in the cancer, is entirely gone, and the nervous sensibility entirely restored to the part. * * *

Yours, S. M. BARNER.

This case is sufficiently described by the patient. The cure here was effected with the judicious application of the chloride of zinc.

CASE VI.—Mrs. B., of Cynthiana, Ky., came to consult me for encephaloid or medullary cancer of right breast. She had been examined by the best surgeons in Kentucky, and pronounced incurable. I removed the entire breast with the knife. The tumor weighed nine and a half pounds. After dressing it with water-dressing for ten days, I then applied the sulphate of zinc in powder, sloughed it with elm poultices, and then suffered it to heal by granulations. Mrs. B. is still well.

CASE VII.—This case was reported by Professor Daniel Drake, of the Ohio Medical College, and formerly of the Louisville University, whose reputation as a medical man was never questioned.

"This case is not unworthy of a passing notice. The patient, in the latter part of last summer, or early in autumn, was brought to Cincinnati by her husband, for the purpose of consulting Dr. Rives, who, after an examination, desired me to see her. We found her left breast enormously enlarged and tuberous; some parts were much softer than others; portions of it had a dark red color, and the veins of the skin in many parts were varicose. The tumor had been several

years arriving at this condition. It was the seat of occasional pain, and the general health of the patient was impaired. In short we concurred in the opinion that it was *fungous hæmatodes*, and that excision was inadvisable. Under this diagnosis and prognosis, we recommended her to return and do nothing. She left us, but instead of going home, visited the neighboring town of Gallipolis, in Ohio,* and put herself under the care of a practitioner, who, it was said, could cure all sorts of cancers without an operation. In the ensuing winter I received a newspaper containing a letter from this lady, who is a respectable teacher of girls at Coal Bridge, stating that she was well. The publication, I confess, took me by surprise, while it afforded me great pleasure. It was to ascertain by personal observation her exact condition, that I stopped at the place just mentioned.

"I found that her breast was entirely gone, and the skin over the part apparently sound and healthy. The eschar was somewhat extensive, sprangling, and felt rather hard, but she said it was entirely free from pain and all morbid sensibility. There were no axillary tumors, but I am not quite certain that there were any last summer. Her appearance was healthful, and she assured me she never felt better in her life. The account she gave of the treatment was, that the doctor, whose name I have forgotten, began by making a hole in the breast with caustic, into which he put something that killed successfully, the whole tumor. The dead parts he dissected out with scissors, from time to time, and in the aggregate they weighed eleven pounds. During this treatment, which lasted for several weeks, she experienced considerable pain, which was alleviated with sulphate of morphine. After all the diseased structure was removed, granulation and cicatrization proceeded rapidly, and when I saw her, at least six months had elapsed without any symptoms of disease in that or any other part.

"Now, if Dr. Rives and I were mistaken in the diagnosis of this tumor, and it was neither carcinomatous nor encephaloidal, it was at least a very large, painful, chronic induration of the breast; and although the removal of such a non-malignant tumor with a knife would have been a preferable mode, still we see that it may be accomplished successfully with caustic. But I cannot give up the opinion that it was malignant, and under that conviction I am led to indulge in a few speculative remarks.

"In all cases where cancer or encephaloid is the offspring of a constitutional diathesis, the removal of the tumor, either by incision, or any kind of caustic, must of necessity, be unavailing; but if there be cases not preceded by such a diathesis, extirpation may be permanently successful. The canons of surgery direct that for this purpose the knife

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* At that time I resided at Gallipolis.

should be preferred to caustic. But is this certainly correct? The object of the operator is to remove the whole of the diseased *structure*, but diseased *action* precedes and causes the morbid structure, and that kind of action in a general or incipient stage may exist in parts which show no pathological change, and thus render the operation unavailing. Now may it not be—may it not happen—that among the various kinds of caustics and escharotics, there is one that may destroy both the pathological structure and the pathological action, and thus achieve what the knife cannot? I confess that I am not without hope, and that this question will, sooner or later, be answered in the affirmative. But experiment is necessary to an answer of any kind; no regular member of the profession, however, is much inclined to such experiments, because they tend (improperly) to place him, in the estimation of his brethren, in the category of mere empirics. Such being the public opinion of the profession, why should we discourage our patients from placing themselves in the hands of the latter?

"The only objection to their doing so, is that tumors and ulcers which are non-malignant may be aggravated by the harsh treatment, but in most, perhaps all cases, regular physicians are consulted before the cancer doctors, and may then declare the diagnosis. Moreover, it is a painful and unsatisfactory thing to a patient to be told that his disease is irremediable, and that he will live longer to do nothing than to do anything. Few hearts are stout enough to endure, and to patiently wait such a course. It is better, therefore, for the happiness of the patient to be doing something; and if what is done should shorten life, he loses very little. Referring then to the *possibility* of a valuable discovery, and to the cheerfulness of the unfortunate victims of cancer and encephaloid, I can see no objections to their consulting empirics. At the same time, I am bound to say, that the majority of that class are mere impostors, and use what the regular profession have long since tested, and found ineffectual. It is not my intention to class with such the individual who treated the case of which I have spoken, for I neither know him, nor the agent which he employed." *

Professor Drake ought to have known me, notwithstanding his declaration to the contrary. For he came to see me, and conversed with me about the case before he went to see the lady; and more, I had been his pupil, and then had his name to my diploma. The truth is the doctor and his friends were cornered, and they had to get out of the scrape as best they could. The lady was a popular writer, and spared no occasion to show up the prejudices of the profession. She had been in their hands and they had pronounced her case incurable. —R. S. N.]

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* Western Journal of Medicine and Surgery, Sept., 1847, Vol. viii, No. 3.

CHAPTER IX.

BLOODVESSELS.

ARTERIES.

The two great arterial trunks, the aorta and pulmonary artery, agree generally in structure and function, but differ remarkably in two respects: The branches of the former unite or anastomose freely with their neighbors, while those of the latter continue unconnected from their origin to their termination; and the coats of the aorta are prone to morbid action, while those of the pulmonary artery are hardly ever known to suffer from it. It is the aorta alone which affords subject for surgical practice.

The arterial tube is composed of three coats: 1. The external or cellular; 2. The middle or fibrous; and 3. The internal or serous. The first of these consists merely of condensed cellular membrane, and is therefore not recognized by some as a distinct tissue, being regarded rather as a modification of the cellular sheath which envelops other organs of the body. But the larger arteries and veins, where lying contiguous, have usually a covering of this kind in addition to the one in question, which, from its compactness, strength, and constant existence, ought certainly to be considered an essential constituent part of the vessel. The middle coat is composed of circular fibers, which, from their appearance and properties, may with most propriety be referred to the elastic tissue. When examined in a large artery of the human body, or in the artery of a large animal, as the horse, they are distinctly extensible and resilient, so as to resemble the *ligamentum nuchae* of quadrupeds and other similar structures. The elastic property of this coat must tend to preserve the vessel of a certain size, in opposition to the distending force of the blood, and the effect of any vital contractile power resident in the arterial tissue. That the arteries do possess such a power, cannot be denied, since, during life, and even for some time after death, at least after the extinction of sensation, they contract much beyond the limit determined by their elasticity, whenever they are freed from the distension of their contents. The internal coat is distinguished by its thinness and smoothness; it is probably lubricated by a secretion from its own surface, and resembles the membranes which line the cavities of the body, whence it is named the Serous Coat.

All of these coats are vascular, and capable of performing the actions, whether healthy or morbid, which are exercised by the

nutritious system of other parts, but the internal one is most subject to disease, and generally seems to be the source of alterations from the healthy structure, when they occur in the other constituent parts of the vessel. The actions which take place in it most frequently and readily, are effusion of lymph and diseased nutrition.

Effusion is induced as an immediate effect of various local irritations, such as pressure or wounds; on which circumstance are founded the various methods of obstructing arteries, that have been proposed in the treatment of disease. It is ascertained, from experiments made on dogs and horses, that, if an artery be subjected for some hours to the pressure of a tight bandage encircling the limb, the canal of the vessel sometimes becomes impervious. This effect results more surely when the sides of the artery itself are directly compressed; and Dr. Jones discovered, that, when the internal and middle coats are divided, lymph is effused so copiously that obstruction frequently ensues, though the constriction be not continued after the division is effected. Desault had ingeniously contrived to do this by tying the vessel tightly with a firm round ligature, which, making no impression on the tough external coat, but dividing the soft yielding ones within, could be removed so as to leave the former entire, and the latter completely cut. Various attempts have been made to obliterate the arteries of the human subject by these means. Assalini employed little forceps, the blades of which could be approximated with regulated force by a screw passing through the handles. Mr. Crampton made use of a piece of wood about three inches long, and having an oval extremity, in which there were two holes, for receiving a narrow tape after it was drawn under the artery, when it was tightened by a screw in the handle.* Mr. Travers conjoined pressure with division of the inner coats, by tying a ligature tightly with a slip-knot, and removing it from a few hours to two days afterward. These scientific and reasonable trials occasionally proved successful in practice, but the results have been very irregular. The obliteration of human arteries, though accomplished by the same process, appears to be not so readily induced or completed as in the lower animals. And there are few situations in which the vessels are sufficiently accessible to admit of the necessary manipulations for effecting a temporary obstruction. All proceedings with this view are therefore now abandoned, and the method invariably followed, consists in tying the vessel firmly with a small round silk ligature, which is left to be detached by the ulcerative absorption instituted through the irritation caused by its presence; the effusion of lymph that directly succeeds its application, sealing up

* Med. Chirurg. Trans., Vol. vii.

the cavity both above and below, so as to prevent hemorrhage during the process of separation.

M. Amussat of Paris has lately contrived another method of obstructing large arteries, which generally succeeds in the lower animals, and has also been executed with success on the human subject. It consists in seizing the bare coats of the artery transversely with two pairs of forceps, and then, separating the two instruments from each other, so as to rupture the internal coats, and throw them into folds. The effect of this procedure is interesting in respect to the pathology of the arteries, but will not probably be preferred in practice to that of the ligature.

Lymph is also effused from the arterial coats as a consequence of inflammation; and the spontaneous obstructions which thus ensue deserve much attention. Though probably not very uncommon, they escaped observation until very lately, and are yet far from being generally known. The inflammation may be limited to a small part of the vessel, or affect nearly the whole of the arterial system. The circumstances immediately concerned in its production are unknown; but it is observed to be nearly confined to adults at or beyond middle age, having a bad habit of body. According to its extent and violence, the patient feels pain in the region of the vessels concerned, which is aggravated by pressure or motion, and attended with more or less fever. As, from the depth of the vessels, there is no external appearance of disease, these symptoms are usually referred to rheumatism, and medical aid is not required until inconvenience begins to be experienced from the obstruction in the circulation which ensues; at least such has been the case in nearly all the instances of this occurrence hitherto recorded. The impoverished limb becomes cold and numb; and if stimulating means be employed to rouse the weakened actions, they readily excite inflammation, which speedily runs on to gangrene and mortification. On dissection, the vessels are found contracted, thickened in their coats, and firmly plugged with a firm, brown, fibrinous coagulum. The internal coat is sometimes ruptured or irregularly lacerated, so as to impede the channel of the vessel. Obstructions of the vessels with coagulum used to be considered a regular consequence of mortification; but it is now ascertained to be by no means a common occurrence; and when it does happen, ought probably rather to be regarded as a cause than an effect of the mortification. Instead of the disease leading to the death of the part, there is reason to believe that it sometimes terminates in recovery, owing to the blood passing through anastomosing vessels, which gradually enlarge, so as to convey adequate nourishment.

Opportunity is seldom offered to treat the primary inflammation, and its diagnosis would not be easy. In case of its being discovered

sufficiently early, the proper remedies would be local bleeding and fomentations, with calomel and opium given internally.

Fig. 5.



[In my opinion little or no treatment at this stage is necessary. Certainly not the measures recommended by Professor Syme, unless it be desirable to get up an irritable condition of the whole system.—R. S. N.]

After the obstruction is completed, which may be learned by the coldness, numbness, want of pulsation, and history of the case, the utmost care must be taken to protect the weakened part from depression on the one hand, and excitement on the other. It ought to be warmly clothed, but guarded against external heat and all other stimulants. Should mortification ensue, amputation ought to be performed above the obstruction, unless a line of demarcation appears below.

Diseased nutrition of the internal coat is a very common occurrence, especially in advanced age and unsound constitutions. The consequence of it is a deposition either of a soft pultaceous substance, which is named its atheromatous degeneration; or of calcareous scales, which constitute what is called ossification of the artery. In both cases this morbid change affects principally the inner coat, a slender film on the surface of which remains as a lining to the vessel. The two diseased alterations generally exist together, in variable proportion. They affect most frequently the aorta, and arteries of inferior extremities. They seldom take place extensively before the age of sixty; but are then so common, that they might almost be regarded as natural occurrences. Males are more subject to them than females. When an artery becomes ossified, it usually dilates, and thus transmits the blood more readily than might be expected from the thickening which it suffers; but still, owing to the rigidity of the tube, or some other cause, it does not seem to do so with the same freedom as in the natural state; and the patient complains of weakness, pain,

and other uncomfortable sensations, with more or less emaciation in the part of the body where the vessel is distributed. The mortification described by Mr. Pott, which sometimes attacks the toes and feet of old men, has been ascribed to ossification of the arteries, but not very satisfactorily; since, if this cause were sufficient for its production, it ought to be much more frequent than it actually is. In the cases I have had an opportunity of dissecting, the arteries were not only ossified, but completely obstructed by a dense coagulum; and perhaps the weakened limb may be finally destroyed by the altered surface of its vessels causing coagulation of their contents.

WOUNDS OF ARTERIES.

When an artery is wounded, the blood issues from it with great force in a stream, which is either continuous, or varied by successive pulsatory jets, according to the size of the vessel, and the aperture made in its coats. Unless the artery concerned be very large, or particularly circumstanced, as will be explained hereafter, in which cases the hemorrhage does not cease until the individual has suffered a fatal depletion—the flow of blood gradually diminishes, and after a time ceases, when the wound heals as it would have done in other circumstances. Various explanations have been offered to account for the spontaneous cessation of arterial hemorrhage. Petit (1730) referred it to the coagulation of blood, first without, and then within the orifice of the vessel, so as to form a sort of cork or stopper to it. Morand (1736), in addition to coagulation, insisted upon there being also contraction of the mouth of the artery, both as to length and width, so that it assumed a conical form, which retained the clot. Pouteau (1760) rejected the preceding explanations, and referred the whole effect to injection of blood into the cellular substance. Dr. Kirkland (1763) maintained, to the conviction, for a long while, of most surgeons in this country, that the process consisted in shrinking and obliteration of the wounded vessel up to the first branch that came off above the injured part. In 1807, Dr. Jones proved, by a full and conclusive course of experiments, that none of these opinions were correct; that the process in question was a complicated one; and that it consisted of various distinct steps. He ascertained that, in the first place, the extremity of the artery contracted somewhat, and withdrew itself by retraction; that then the blood was injected into the surrounding cellular substance, especially that of the sheath, and coagulated there, after which a coagulum formed first on the outside, then in the interior of the orifice of the vessel; and that, lastly, lymph being effused from the cut edges of the arterial coats, became gradually organized, so as to complete the obstruction. In the course of time, the artery contracted up to the first branch, and the clots were

absorbed, when the cure might be considered complete. When the artery, which has been wounded, is prevented from retracting by its firm connection with the neighboring parts, or by being only partially divided, or when the surrounding cellular substance is either very dense, or very lax, this process is impeded, and the hemorrhage proves more obstinate than in ordinary cases. On the contrary, when an artery is not cut, but torn across, it seldom bleeds at all, even though of large size, because the external or cellular coat being the last to give way during the stretching of the artery, when at last ruptured, is elongated beyond the internal and middle ones, and instead of resuming its relative situation with regard to them, collapses into a conical form, so as effectually to close the orifice. This explanation I ventured originally to give on the authority of experiments repeatedly performed, and as affording a more satisfactory explanation of the fact than those hitherto offered to account for it—viz: that arteries retract more when torn; that the edges of the orifice are killed by the violence, and, therefore, induce more speedy coagulation of the blood; and that the internal coats are more extensively ruptured than the external one, so as to form irregular folds or projections into the cavity. Every opportunity of ascertaining the truth by actual examination, and they have not been few, has tended to confirm my opinion, showing that the internal and middle coats terminate abruptly by a smooth circular edge, as if cut by a ligature, and that the external one forms a conical bag, containing coagulated blood.

In some constitutions, there is a remarkable disposition to bleed, so that the slightest wounds become troublesome, or even dangerous. This hemorrhagic tendency is generally observed most distinctly in children; is associated with both fair and dark complexions; is frequently hereditary, and can be discovered only by experience of its effects.

The means employed artificially for conducing to the cessation of hemorrhage, may be referred to the ligature, pressure, and styptics. The use of the ligature was introduced by Ambrose Paré, in the latter end of the sixteenth century. He, and, still more, his successors, applied it injuriously by including a portion of the surrounding tissues to give it a secure hold. Paré employed large broad-bladed forceps, called crane-bill from their shape; but the instrument generally preferred, was a curved needle, which, being thrust through or around the vessel, together with the parts adjoining, subjected to the ligature a mass not only quite superfluous, but which likewise was apt to occasion great inconvenience by shrinking subsequently, so as to render the ligature loose, by delaying its separation, or by exciting inflammation. Mr. Bromfield (1772) pointed out the propriety of tying merely the coats of the vessel, and introduced into general use for this

purpose the Tenaculum, which had been previously recommended by Cheselden. It consisted of a sharp, curved, round needle fixed in a handle, and was employed to transfix and draw out the mouth of the artery, so as to let the ligature be tied about it. The common dissecting forceps, until lately, almost superseded the tenaculum, as rendering the insulation of the vessel more easy and complete; but are now little used, in consequence of the more convenient instrument, which has been introduced, chiefly through the recommendation of Mr. Liston. The best material for the ligature is *stay silk*, of such strength, that twenty-four yards of it weigh one drachm. It ought to be waxed previously to being used.

When the artery wounded is of large size, it must be tied both above and below the opening, as the anastomosing branches would otherwise maintain the hemorrhage from the inferior orifice. If it is necessary, in order to apply the ligatures, to expose the artery more fully, this should, if possible, be done by dilating the original wound, since there is apt to be much difficulty in finding the aperture when the surgeon cuts down on a different side of the vessel from that which is punctured.

In tying an artery which has bled repeatedly, it is necessary to beware of mistaking for the orifice of the vessel a fibrinous cylindrical extension of it, the ligature of which could not produce any permanent or beneficial effect.

Pressure may, on many occasions, be employed to suppress hemorrhage more conveniently than the ligature, as when the artery is but small, or lies over some unyielding part which can afford good counter-pressure, or is much branched and freely connected with neighboring arteries of large size, so that several orifices would require to be tied, when it is situated so deeply that the ligature could not be applied without a serious operation, or is in a state of ulceration. In wounds of the hands and feet, especially the palms of the former, and soles of the latter, no method is so convenient for stopping bleeding as pressure. Lint or sponge may be employed to effect the pressure; but the former is on many accounts preferable. Folded portions of it, successively increased in size, constituting what are called graduated compresses, ought to be applied over the bleeding vessel, and secured by a proper bandage. Unless the first one is placed directly on the orifice of the artery, the subsequent pieces, however firmly compressed, will have little effect, and, therefore, the wound should, if necessary, be dilated sufficiently to admit the lint. When the hemorrhage takes place into a cavity, the parietes of which are firm and unyielding, it may sometimes be restrained by closing the outlets, so as to make the blood accumulate, and press upon the orifices whence it issues. Thus epistaxis, or bleeding from the nose, may be arrested, and also hemor-

rhage from the uterus in the early months of pregnancy, by plugging the nostrils and vagina. Bleeding from a leech-bite may be arrested by transfixing the wound with a sewing needle, and tying a thread tightly round it. In the same way was subdued a hemorrhage from the umbilicus of an infant, two weeks old, which I saw with Dr. Begbie, and where the actual cautery had been used in vain, at the suggestion of the late Dr. Hamilton, who said that the very few cases of the same kind previously seen by him had proved fatal. I passed two sewing needles crosswise, as deep as possible, through the conical cavity from which the blood proceeded, and then tied a thread round them.

Styptics are agents which, independently of any compressing effect, possess a power of checking hemorrhage. Of these may be mentioned the sulphates of copper, zinc, iron, and alumina, and the nitrate of silver; strong spirits, oil of turpentine, and the actual cautery; also, soft spongy or powdery substances, such as dried lycoperdon, spiders' webs, and the agaric of the oak or amadou. This last constituted the famous styptic of Brossard, which possessed a very high reputation, both in France and in this country, toward the close of the last century. Before the proper principles for applying the ligature were ascertained and received, styptics were regarded as important means for controlling hemorrhage; but they are now very little used; and the actual cautery is almost the only one of them still retained in use. It is occasionally, but very rarely, resorted to, on account of bleeding in situations inaccessible either to the ligature or to pressure. M. Amussat has lately endeavored to introduce a fourth mode of suppressing hemorrhage, which consists in twisting the mouths of the vessels. This *torsion* is effected differently, according to the size of the artery. When small, it is simply twisted; when large, the internal coats are first pushed back by means of one pair of forceps, while the extremity is tightly held by another. There can be no doubt as to the possibility of attaining the object on this principle; but the expediency of doing so seems much more questionable. In the removal of a tumor, or any other considerable dissection, most of the arterial branches which throw out jets of blood when divided, are speedily obstructed by the spontaneous process; so that, at the conclusion of the operation, only the few of larger capacity, requiring ligatures, present themselves to view. Now, if every bleeding point had been subjected to torsion, in the first instance, it might thus seem to have been productive of great benefit, while, if applied to the larger vessels, it would not afford so complete security as the ligature. There is accordingly hardly any case in which the torsion proves useful, except in wounds of the lips and cheeks, in which union by the first intention is very desirable, and almost certainly effected if the raw edges are placed properly in

contact. But the coronary arteries, and other branches of the facial, cannot be tied without leaving threads apt to disturb the adhesive process, while from the projection of their cut extremities beyond the surface of the wound, they are very favorably situated for being twisted.

The bleeding, after it has been stopped, sometimes returns, when it is called secondary hemorrhage. If it has ceased spontaneously merely through the natural process, aided perhaps by syncope, which favors coagulation, the reaction of the system that ensues within an hour or two is apt to reinduce it. If arrested by pressure, it may return either at this time, or not until two or three days afterward, when the feverish excitement which is then occasioned by the irritation of the wound, tends to promote it; and if a ligature has been applied, the ulceration by which it is separated, if too rapid or extensive, may cause a bleeding from three days to as many weeks after the infliction of the injury. When the hemorrhage, therefore, is considerable, the local means of restraining it ought to be assisted by those which produce a corresponding effect on the system, such as rest, quiet, low diet, cooling purgatives, and whatever else may seem likely to moderate the force of the circulation.

It has been proposed to obviate the immediately fatal effect of excessive hemorrhage, by transfusing the blood of another individual into the veins of the patient. The experience hitherto acquired on this subject is very limited, and far from satisfactory. The profuse depletion requisite to sanction such a proceeding is generally either accompanied with some incurable lesion of the system, or happens in circumstances which prevent the preparations for it from being completed soon enough.

The simplest and best mode of performing the operation, is to fasten a bladder to the canula of a small trocar, or a small silver tube made for the purpose, with its extremity rounded and slightly curved, which, being introduced into one of the veins of the arm, will transmit the blood received into the bladder, as it flows from the person who affords it, and descends into that of the patient by its own weight, or the influence of slight pressure exercised on the bag. The various ingenious and complicated apparatus, which have been contrived for effecting transfusion, are less manageable than this very simple one, which may always be constructed extemporaneously, and are objectionable on account of the extensive surface of dead matter to which they expose the blood, besides the risk of injecting air that attends their use.

ANEURISM.

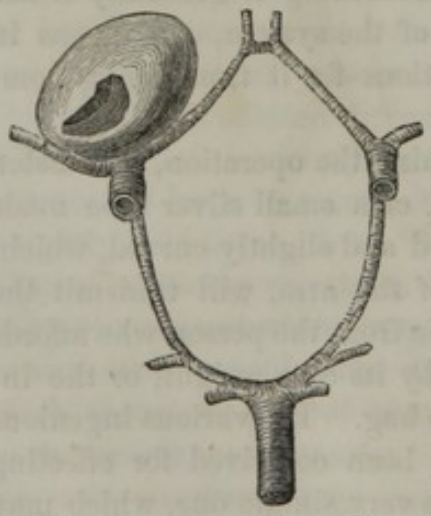
By the term Aneurism is understood a sac containing blood, fluid or coagulated, and communicating with the trunk of an artery.

There has been much dispute as to the constitution of the aneurismal sac. Sennert, Severinus, Hildanus, Wiseman, etc., supposed that all the coats of the artery were destroyed; and that it was formed by the surrounding cellular substance alone. Ferrestus, Ruysch, Diemerbroek, etc., thought that the artery was merely dilated; while Morgagni, Lancisi, Guattani, etc., maintained, that aneurisms might result from simple dilatation of the vessel, or from expansion of the cellular substance, and therefore divided them into true and false, accordingly as the artery was dilated or ruptured. Scarpa has labored to prove that the former do not exist, there being always rupture of the internal and middle coats. He has not succeeded in establishing his opinion to the full extent, but has certainly ascertained that it is extremely rare to find the artery entire, and forming the sac by its mere expansion.

Aneurisms may be conveniently divided into true and false. The former being those in which one or more of the arterial coats remain entire; the latter, those in which the vessel is completely ruptured, and the sac is formed by the surrounding cellular substance.

True Aneurisms may be subdivided into those which consist of simple dilatation of all the coats, and those in which the external one alone remains entire. The former are very rare, and nearly confined to two parts of the arterial system, viz: the aorta, and arteries of the brain. It was formerly supposed from careless observation, that aneurism of the aorta generally depended on dilatation of all the coats, but Scarpa showed that, in a great majority of cases, the inner ones at least were ruptured. Exceptions, however, are sometimes met with, in which there can be no doubt as to the integrity of the vessel. In the arteries of the brain, the external coat is very thin, and affords little resistance when the inner ones are destroyed by disease. Aneurism is therefore very rare in this situation, and when it does occur, depends on a general dilatation of the vessel.

Fig. 6



The true aneurisms, in which the internal coats are destroyed, and the external one alone remains, are much more common. Their shape is not so regular as that of the last mentioned kind, since the external coat does not dilate uniformly round the circumference of the vessel, but usually expands merely on that side where the internal layers are ruptured, so as form a sort of bag or pouch, which often has only a very narrow communication with the artery. The blood, which is

received into this cavity, being removed as it were from the current of circulation, and exposed to a surface different from that of the healthy vessel, has a double inducement to coagulate, and accordingly does so, not all at once, but by degrees, thus forming a succession of concentric fibrinous laminæ, which line the aneurismal sac, and sometimes fill its cavity completely.

The arteries liable to this disease are almost all the great trunks of the system; and the parts of their course most frequently affected are those where they give off large branches, or are exposed by their situation to sudden extremes of tension and relaxation. The aorta at its arch, origin of the celiac, and its bifurcation, the carotid at its division, the axillary, the external iliac at the groin, and the popliteal, are the most common seats of its occurrence. The first step in the production of this kind of aneurism is the formation of a breach in the inner coats (Fig. 7), through which the blood, being constantly urged by the force of the heart, will pass and gradually extend the cellular coat into a bag. The tumor thus caused must press upon the surrounding tissues, and excite, by the irritation of its constantly increasing size, such an effusion of lymph into their textures as will greatly strengthen the parietes of the bag. The original breach or crevice can generally be traced either to a blow, sudden extension, and such sorts of violence, or to violent impulse of the heart, consequent upon some emotion of the mind or exertion of the body. It would be difficult for these means to rupture the internal coats of a sound artery, and if they did so, the speedy effusion of lymph would, we have reason to believe, in most cases at least, not only repair the injury, but obliterate the vessel. The artery, therefore, must in general be predisposed to suffer the process that has been described, by undergoing morbid degeneration of the internal coat, which renders it soft, easily torn, and unfit for performing the adhesive action. It has been already stated, that the inner and

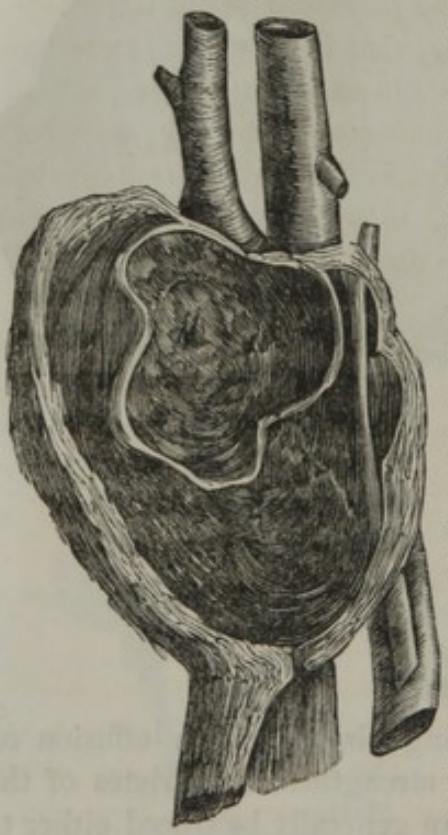
Fig. 7.



middle coats, though extensively altered in their structure, usually retain a thin membranous film, were it not for which, the frequency of aneurism would doubtless be much greater than it actually is; since in that case there would be no occasion for any particular force to cause the breach, and it would occur as a certain consequence of the atheromatous alteration. Males are more subject to the disease than females, probably for the double reason that their predisposition to unsoundness of the arterial coats is stronger, and also that they are more exposed to the exciting influence of violent exertion, which may operate in determining the morbid degeneration of the artery concerned, as well as in directly causing the commencement of the aneurism.

In false aneurisms none of the coats remain entire, and the sac is formed, in part of its extent at least, merely by the surrounding cellular substance. They are generally of larger size and more irregular figure than those which retain part of the arterial coats in their composition, whence also their contents are usually more completely coagulated. They are produced in two ways: 1. By the formation at once of a breach through all the coats of the vessels together, which may be effected either by wounds, or other kinds of violence, or by ulcerative absorption; 2. By the sac of a true aneurism giving way, so as to allow its contents to escape, and distend the cellular substance into another bag, as in this case (Fig. 8), where the sac of a true aneurism of the femoral artery is seen lying inclosed in that of a false one. They are therefore divided into primary and secondary; they occur much more extensively over the arterial system, than the true kind, since they not only result from these, but may arise from almost any artery that is wounded, and are frequently connected with vessels of inconsiderable size, such as the temporal or radial, while those of spontaneous origin are limited to the larger trunks.

Fig. 8.



The signs of aneurism are tumor, subsiding under pressure, and returning when relieved from it with a whizzing noise, and thrilling feel; pulsation, or rather violent distending throbbing; feebleness of pulse, coldness, numbness, and weakness of the parts beyond the disease, œdematous swelling and pain, owing to the pressure of the aneurism on the veins and nerves. When the aneurism is internal,

these indications cannot always be recognized, but there are then generally others presented by the derangement of function, which is caused by the presence of the tumor impeding the action of neighboring organs. These, however, are often not distinct, and at the same time are apt to be mistaken for the signs of other affections. The compressibility and pulsation of the tumor are the grand distinguishing characters of aneurism. They are most distinct when all the coats remain entire, because then the contents of the sac generally continue fluid; they are usually well marked so long as the external coat does not give way; but in false aneurisms, especially those of old standing, where the cavity is of large size and irregular figure, they are often very obscure, or altogether unobservable, owing to the extent of coagulation which is apt to occur in such circumstances. The pulsatory movement communicated to solid tumors by large arteries lying under them, is sometimes mistaken for the pulsation of an aneurism. This error will be avoided by recollecting, that in aneurism there is a general and forcible expansion of the whole sac, which can be perceived as distinctly when the tumor is embraced laterally, as when the hand is placed upon it, while the deceitful impulse communicated by an artery to a tumor seated over it, is merely a faint heaving upward, which can be felt only when the surgeon presses in the direction of the vessel.

The natural course of aneurism is to grow larger and larger, to change from the constitution of the true into that of the false kind, and then to terminate in one of the following modes: 1. The contents coagulate, and are absorbed with, or without, obliteration of the vessel; as in the remarkable case here represented (Fig. 9), from a preparation in the University Museum, where an aneurism of the aorta had undergone a spontaneous cure, and of which Dr. Monro has given a particular account in his observations on aneurism of the abdominal aorta;* 2. The artery becomes obstructed from coagulation, or the effusion of lymph, and ulcerative absorption of the parietes of the tumor allows its contents to escape; 3. The sac opens by ulceration or sloughing, without previous obstruction of the vessel. The consequence of the first two of these terminations is a natural cure, that of the third a fatal hemorrhage.

The treatment of aneurism consists in the use of means which tend to promote one or other of the two salutary processes just mentioned. The earliest attempts of this kind were directed with a view to the second of them, and their rudeness was equaled by their severity. The sac having been opened by cutting or burning, its contents were turned out, and then the hemorrhage was restrained by repeated appli-

* Edinburgh Journal of Medical Science.

cations of the actual cautery, or some other powerful styptic. The introduction of the ligature for closing the mouths of arteries rendered this operation less painful, formidable, and uncertain; but the difficulty and danger attending it continued to be very great, and the instances of recovery were extremely rare. Surgeons, therefore, turned their attention to the other mode of natural cure, and endeavored to promote coagulation, by lessening the force of the circulation, through the effect of bleeding, low diet, and rest. This plan of treatment is usually distinguished as that of Valsalva. In addition to these means, Guattani has recommended tight bandaging of the limb and tumor. Both methods were found to be extremely inefficient and uncertain, so that, though productive of less harm, they hardly afforded more benefit than the bloody proceeding which has been already described, and was in those days called the Operation for Aneurism. The good old fashion of performing amputation of the limb affected was therefore generally followed, until it fortunately occurred to John Hunter, (1785) and much about the same time to Desault, that an effectual method of causing coagulation would be to obstruct the artery above the tumor, or between it and the heart, so that thus the natural cure by coagulation and absorption might be safely and certainly induced.

Fig. 9.



The first trials of this new practice were hardly so successful as was anticipated, owing to the vexatious, alarming, and not unfrequently fatal hemorrhage which attended the separation of the ligature applied to effect obstruction of the artery. To obviate this cause of failure various contrivances were employed. The ligatures were sometimes drawn gently, lest they should cut the coats of the vessel, or a little roll of plaster was interposed with the same view between the knot and artery. Ligatures in the form of tapes were employed; two or three of them were tied at some distance from each other, so as to

compress a considerable extent of the vessel; and ligatures of reserve, as they were called, being introduced under the artery, beyond those which had been tied, were left loose, so that they might be drawn tight if occasion should require. Notwithstanding all these precautions, bleeding still occurred as often as before, and proved, if possible, even more unmanageable. In despair, therefore, of obstructing arteries safely in this way, attempts were made to obliterate them without inducing the ulcerative absorption which was requisite for the separation of the ligature. Simple compression of the vessel, division of its internal coat, and these two means conjoined, were tried for this purpose, but, as has been already stated, however promising they might appear from their results when practiced on the lower animals, they were found to operate very uncertainly on the human arteries. Though these experiments thus did not lead directly to any practical improvement, they occasioned such a series of extensive and accurate observations as had the happy effect of developing the true principles on which the bleeding caused by ligatures depends, and consequently showed how it was to be avoided.

The great source of danger was found to proceed from the ulceration which detaches the ligature going beyond due bounds; and it was ascertained that the circumstances most conducive to this, were extensive separation of the artery from its neighboring connections, the interposition of much foreign matter between it and them, or the irregular puckering of the coats by flat or twisted ligatures, also, laceration and contusion of the neighboring tissues, caused by exposing the vessel with the fingers or any blunt-pointed instrument, which prevented union by the first intention, and excited inflammation. Such being the case, it naturally followed that the most effectual method of preventing hemorrhage was to use a ligature small, firm, and round, to pass it round the artery with as little disturbance as possible to its connections, and to draw it tightly. It is to British surgeons, especially Messrs. Jones, Hodgeson, Lawrence, and Travers, that the profession are chiefly indebted for establishing these principles, which render the use of the ligature in the hands of a good operator equally easy and safe. To them, also, and more particularly to Cooper, Abernethy, and Liston, together with Drs. Post and Mott in America, is to be ascribed the honor of leading the way by their bold and successful operations, resting on the sound foundation of a correct pathology, to the practice of the present day in the treatment of aneurism, which contrasts remarkably, by its simplicity and safety, with the complexity and danger of the older methods.

The ligature should consist of waxed stay silk, and may in every situation be passed round the artery by means of a simple needle, after the sheath of the vessel has been opened merely to an extent

sufficient for the purpose. One ligature only ought to be employed, unless the operator unfortunately denudes the artery too far, when he will diminish the risk of hemorrhage by introducing two threads, and tying them as far apart from each other as the detachment of the vessel permits, after which he should divide the artery between them. Mr. Abernethy recommended this proceeding as being proper on all occasions admitting of it, in order to take off the effect of tension, and place the ligature as nearly as possible in the same situation with one applied after amputation, where the chance of bleeding is known to be greatly less. The difference of the two cases in all probability does not depend on tension, while cutting the artery between the ligatures is attended with considerable danger of hemorrhage, and it will, therefore, be proper to confine this practice to the circumstances which have been mentioned as requiring it.

[The danger of hemorrhage, after the application of ligatures, may be greatly lessened, by tying both ends of the separated artery, or, in case it is not separated, tie it with two ligatures as far apart as convenient, and then separate it. When the distal end of the artery cannot be found for ligaturing, the best results may be obtained by plugging the wound to its bottom by a graduated sponge compress; but by all means search for and tie both ends if possible.—R. S. N.]

After the principal artery of the limb is obstructed, the capillary anastomoses of the branches, which arise above and below the impervious part, afford a new channel for the conveyance of the blood, and, in general, so free a one, that little apprehension need be entertained of bad consequences from imperfect circulation. The dilatation of the small vessels, which occurs before the operation, owing to the natural channel becoming more or less impeded by the disease, also contributes to prevent this. It has been thought by Dr. Parry, of Bath, M. Maunoir, of Geneva, etc., that new branches are occasionally formed, after a time, between the obstructed extremities of the artery, leading directly from the one to the other; but there can be no doubt that the alleged new vessels are really the old ones of the sheath, which become enlarged in a greater proportion than the neighboring capillaries, conformably with a well ascertained law of anastomotic circulation—viz: that those branches have the greatest tendency to enlarge which lie most nearly in the course of the obstructed vessel. In order to prepare the new passage for nourishing the limb, it has been proposed to delay operating in recent cases; but the inconvenience attending a large sac, the contents of which are sometimes slowly and imperfectly absorbed, or excite irritation that induces suppuration, and the risk of the artery becoming diseased nearer the heart, more than counterbalance any slight advantage to be gained in this way.

However free the new channel may be, it is always inadequate, in

the first instance, to afford the full supply of blood requisite for carrying on the various actions as usual. The limb becomes more or less cold and numb, and continues so for a longer or shorter time, seldom exceeding a few hours after the operation. It then rises in temperature even above that of the corresponding sound one, and becomes painful; at the same time slight pulsation may return in the aneurism. To prevent this overaction from proving excessive, and inducing mortification, all sources of additional excitement, such as friction with stimulants, hot fomentations, and the like, ought to be carefully avoided. When the stage of reaction subsides, which it does in a day or two, the limb still remains weak and liable to suffer from slight irritation, so that even the pressure of its own weight occasionally causes sloughing. The support of a flannel bandage will, therefore, be proper, and with a similar view, though moderate and even copious bleeding is very proper previous to the operation, the patient ought not to have his strength reduced to a very low ebb by much depletion, or very rigorous diet during the cure.

[It is obvious, that to induce a weakened condition of the system, by whatever means, when the system requires all its integrity to build up any part of itself, is highly unphilosophical. I shall not, however, feel it my duty to introduce an opposing note every time such a course is recommended by Professor Syme. I have already pointed out the inaccuracy of the system, and shall not do so again, except under some new form.—R. S. N.]

The bad consequences of this operation are gangrene, hemorrhage, and suppuration of the sac. When the sloughing is of limited extent, and dependent on pressure or feebleness of the patient's general strength, it ought to be combated by appropriate local and constitutional remedies; but when it is extensive, and the result of general inflammation of the limb, amputation should be performed without delay, as high, at least, as the artery has been tied. There seems to be reason for suspecting that the mortification sometimes depends on the principal vein becoming obstructed, in consequence of the irritation suffered by its coats during the operation.

The hemorrhage usually occurs about the time when the ligature separates, which is generally from the fourteenth to the twentieth day after the operation; but it may likewise occur either much sooner, or considerably later. It appears for the most part very insidiously, not exceeding a few drops, but recurs, from time to time, in increasing quantity, until the patient, after being perhaps repeatedly saved by syncope, is finally exhausted. Pressure, together with the means which tend to lessen the force of the circulation, may be tried in the first instance; but if the bleeding continues or returns, the

surgeon must, without delay, either tie the artery nearer the heart, or amputate the limb.

Suppuration of the sac is a disagreeable, but not very dangerous occurrence, since it seldom takes place until the artery has been obliterated, so that there is no great fear of bleeding, and little to dread but a foul and extensive abscess. Whenever the matter is actually formed, a free incision should be made to evacuate it, together with the clots; after which, the cavity being in the first instance gently filled with lint, is to be treated with stimulating lotions and pressure. In a case of large diffused popliteal aneurism, for which I tied the femoral artery, suppuration occurred seven months after the operation, and was followed, after evacuation of the matter, by a very copious bleeding, which proved, upon examination of the amputated limb, to proceed from the breach in the artery leading into the aneurism, the vessel having been obliterated by the ligature only to the extent of three inches.

The object of tying the artery being not to prevent the blood from entering the aneurism, but merely to cause such stagnation of its current as may induce coagulation, it was proposed by M. Brasdor, of Paris, to obliterate the vessel *beyond* the tumor, when circumstances prevented the operation from being performed between it and the heart. Some unsuccessful attempts have been made on this principle; but Mr. Wardrop has recorded several instances of its alleged more fortunate application. It is evident that the operation cannot be performed with advantage, if a branch of any considerable size comes off between the aneurism and ligature, as this would allow the current of blood to continue; it could not be of any use in cases where, the sac being small and regularly dilated, the contents remained fluid; and the only occasions where it promises any benefit, are those in which coagulation is already far advanced. But here the passage through the vessel beyond the tumor must be obstructed nearly, if not altogether, as much as it can be by the ligature; so that there consequently does not seem to be much probability of this operation being ever extensively introduced into practice.

[The importance of aneurism, in general, is so great, that it appears to me to be proper to sum up the more important considerations in relation thereto. The general remarks of Professor Syme are very excellent, but there are some minor considerations, of much utility to the student, not noticed by him. The name Aneurism is applied to all partial expansions of the cavity of an artery, or to such effusions of blood as may take place in the surrounding parts after the division of the arterial coats. The symptoms of aneurism are tolerably indicative; yet some of the best surgeons, as Sir Astley Cooper, Sir Benjamin C. Brodie, and Mr. Warner, have been sometimes deceived—

aneurism has been taken for abscess, and *vice versa*. The prominent symptoms are elasticity of the swelling, pulsation of the same, which disappears on pressure, to be renewed as soon as the pressure is removed. If the artery be compressed between the swelling and the heart, the pulsation not only ceases, but the swelling becomes less tense. On the other hand, if pressure be made on the artery below the aneurismal swelling, the pulsation is much more perceptible, and the swelling more tense. If the swelling has made considerable progress, the blood has partially coagulated in it, and cannot be displaced by pressure. Owing to pressure upon the adjacent arteries and nerves, the limb becomes somewhat œdematously swollen, the tumor is covered with varicose vessels, and has a blueish appearance. Inflammation soon sets in, abscess follows, and, in consequence, a dangerous, or it may be a fatal, hemorrhage follows. Aneurisms are most apt to occur in persons with a scrofulous diathesis, or whose systems have been loaded with mercury, and between the ages of ten and thirty-five.

True and false aneurisms are easily distinguished. True aneurism rapidly diminishes under pressure, and immediately reappears when the pressure has been removed. The pulsation in false aneurism is less distinct than in the true. In rare instances, the pulsation cannot be felt, but can be heard either by placing the ear on the tumor, or by a stethescope. The sound of the pulsation has been written *whih—whih*. It is always necessary to examine very closely an aneurism, for mistakes in diagnosis might lead to fatal results. Some occupations are more favorable to the development of aneurism than others. Persons employed in the dissecting room, and especially if drunkards, are almost sure to be affected with aneurism. Aneurism is also greatly more frequent in the male than in the female. The internal arteries are more likely to be diseased than the external ones. This may be owing to the fact, that the nearer to the heart the thinner the walls of the artery. The popliteal and femoral artery at the groin are the most frequent seats of the disease. Of a table of one hundred and seventy-nine cases given by Lisfranc, fifty-nine were in the popliteal and twenty-eight in the femoral at the groin. It is a matter of the greatest importance to be sure that not more than one aneurism exists, before any treatment is begun, as they sometimes are numerous, and to ligature any one under such circumstances, is almost sure to terminate fatally. There is no treatment as yet known, which is so simple and certain as tying the artery. If this be done as already described, the results are nearly always satisfactory. After the operation, the limb should be placed in an easy position, so as not to produce tension of the artery; the patient should be divested of all care and excitement; the limb should be kept at a proper temperature; and the patient furnished a nourishing, though not stimulating, diet.—R. S. N.]

TREATMENT OF PARTICULAR ANEURISMS.

Aneurisms are usually divided into external and internal, accordingly as they affect the branches of the aorta, or its trunk. The former are generally subject to the operation which has been described; the latter admit of no remedy except what may be afforded by the plan of Valsalva.

EXTERNAL ANEURISMS.

Popliteal.—One of the most common situations of external aneurism is the popliteal artery, which being subject to sudden extremes of tension and relaxation more than any other part of the arterial system, must be exposed not only to the directly exciting causes of the disease, but also to the predisposing effect of the same irritations leading to morbid alteration of its coats. The tumor (Fig. 10) occupies the popliteal cavity, which it gradually fills, but hardly extends beyond, so long as any part of the artery remains entire. A circumscribed pulsating swelling is felt in the ham, which weakens the limb, and usually occasions constantly increasing pain, as well as œdema, by pressing on the nerve and vein that lie over it, and forcing them outward. In some cases, so little inconvenience is felt, that the disease escapes observation until it attains a large size. When the external coat gives way, so as to let the blood escape into the cellular substance, and convert the true aneurism into a false one, the swelling suddenly extends in all directions, but chiefly downward, separating and elevating the heads of the gastrocnemius; the limb then becomes entirely useless, excessively painful, and œdematous; the pressure of the tumor induces absorption of the condyles of the femur; and if the disease is left to itself, the aneurism either opens and gives rise to a fatal hemorrhage, or undergoes a natural cure by coagulation and absorption of its contents.

Fig. 10.



It was here that the old operation proved most difficult and appalling; and when we consider the deep situation of the artery, the diseased condition of its coats, and their close connection to the bone through means of the tendinous sheath of the triceps; also the large and shapeless cavity, at the bottom of which the vessel was to be secured; the hardly repressible hemorrhage; and the obstacle occasioned by the vein and nerve lying over the tumor—it does not seem surprising that its results should have been almost uniformly fatal.

Dr. Wilmer, of Coventry, states, that at the time he wrote, there was not an instance of its successful performance in this country.* The modern operation could hardly have been more practicable for aneurism in this situation, if it had not been for the happy improvement of John Hunter, who, observing that no large branch rose from the artery for a long way above the tumor, proposed to tie it on the fore part of the thigh, where it was nearer the surface, and at a greater distance from the disease; where the operation would be easier, and the coats of the vessel might be expected to remain in a more healthy state.

The artery may be tied either before or after it passes under the *Sartorius* muscle, but more conveniently at the former of these points, being there nearer the surface, and farther from the disease.

The patient being placed in a reclining posture, with his knee bent, and the thigh placed on its outer side, the surgeon should feel with the fingers of his left hand for the triangular hollow which is formed by the meeting of the *sartorius* and *adductor longus*, and, if necessary, to make this more distinct, desire the patient to bend his thigh — the attempt at which, by calling the muscles into action, renders their outline more palpable—then stretching the integuments, not traversely, but in the long direction of the limb, he should make an incision from two to three inches long, according to the fatness of the patient, having its lower extremity situated over the angle of union of the two muscles above-mentioned, and running upward at a nearly equal distance from their respective edges. Separating the lips of the wound, he should expose and divide the fascia, after which, making an assistant hold aside the edge of the sartorius, he will expose the sheath of the vessels, and, lifting it up with the dissecting forceps, open it sufficiently to let the coats of the artery be seen distinctly. It is here that the principal nicety of the operation lies, since too much exposure of the vessel, especially by tearing, or the use of blunt instruments, incurs the risk of secondary hemorrhage; and if the arterial coat be not sufficiently divided, there is no less danger of injuring the vein in the passage of the needle. The artery should be exposed by means of the dissecting forceps and knife, just as in a careful dissection on the dead body. The opening in the sheath need not exceed, in length, three-eighths of an inch; but the cellular or fatty substance immediately enveloping the vessel, in variable quantity, must be raised in successive portions, and divided, until the surface of the artery appears perfectly white and distinct.

The aneurism-needle previously threaded is then to be passed round the artery, which will be easily effected if it has been adequately

* Wilmer's Cases in Surgery.

exposed, and the edge of the opening in the sheath is held aside with forceps, to let the point of the instrument enter and escape. In doing this it is necessary to avoid the vein which lies below, and the nerve that runs on the outer or fibular side of the artery. On one occasion in the living body, and in another in the dead, I found a large vein, nearly half the size of the femoral, lying anterior to the artery. So soon as the ligature appears, it must be disengaged from the eye of the needle by the forceps or a hook, and pulled out of the wound while the instrument is withdrawn in the opposite direction. The operator having then satisfied himself that enough and nothing more is included, should tie the ligature tightly in what sailors call the reef-knot, which is done by crossing the ends of the thread first one way and then the other. After the ligature is tied, one of the ends should be cut away to favor union of the sides of the wound. The needle, though introduced with care and dexterity, sometimes occasions a pretty copious flow of blood, which fills the wound almost as rapidly as it is wiped out, but ceases upon the ligature being tied, and probably depends upon the injury of a small branch happening to come off at the part. The edges of the wound should be brought together with a couple of stitches, and lightly dressed.

After this operation, there is a greater difficulty to be encountered, in the establishment of an adequate channel for the blood by the anastomosing branches, than occurs in most other cases. The perforating and external circumflex branches of the profunda pour their contents into those of the articular arteries, but these rising from the popliteal portion of the vessel, which becomes obstructed by the coagulation that follows the operation, must transmit the blood into other branches communicating lower down with the unimpeded arteries of the leg.

If it is wished to tie the femoral artery below the crossing of the sartorius, an incision should be made in the middle of the thigh, commencing about three inches lower than where the one for the former operation terminates. The external or fibular edge of the sartorius being exposed, should be drawn inward, when a strong tendinous fascia passing from the *vastus externus* to the triceps will be brought into view; and when it has been divided, the sheath will appear, containing the artery, vein, and nerve in the same relative situation as they were at the other part of their course. The operation should then be completed as already described.

Though the ligature of the femoral artery is not attended with much difficulty, it is frequently followed by bad consequences. It has long been my conviction that these depend upon the operation being considered too easy, and therefore conducted without sufficient attention being paid to the circumstances above-mentioned, in regard to

exposing the artery and avoiding the vein. In my own practice I have had occasion to tie the femoral artery nine times for aneurism, and never experienced any troublesome effects from the operation.

Case I.—Henry Williams, aged thirty-six, a weaver, was admitted on the 20th of May, on the recommendation of Mr. Cunningham, of Kirkcaldy, to have the femoral artery tied for popliteal aneurism. The tumor occupied the hollow of the ham—it was circumscribed in form—and, from the distinctness of its pulsation, seemed to contain little coagulum. The patient's attention had been first directed to the complaint about two months before, by an uneasy feeling of stiffness in the part, after a particularly severe day's work.

He was confined to bed, and ordered a laxative to prepare him for the operation. Next day the pulsation had become extremely obscure, and though it slightly returned the following day, at the end of two days more it could not be perceived at all. The articular arteries were then felt much enlarged, and the tumor quickly diminished in size, while it increased in firmness, until merely a small knot the size of an olive remained. He was dismissed at his own desire on the 31st of May.

Case II.—William Sinclair, aged twenty-six, was admitted on the 20th of November, on account of a pulsating tumor in the popliteal space of his left leg. It was about the size of an egg, and distinctly circumscribed. The patient stated he had at first remarked the swelling and beating in the month of August, while serving as carpenter on board a whale-ship in the North seas.

The femoral artery was tied on the 3d of December. The ligature separated on the 28th, and the patient was dismissed quite well on the 9th of January.

Case III.—John Lockie, aged twenty-nine, a shopkeeper in Edinburgh, was admitted on the 17th day of April, on account of a large pulsating tumor occupying the ham and calf of the right leg. There was considerable œdematous swelling of the limb from the knee downward, and over the shin-bone there were some dark colored spots, which had been produced by the pressure of a carefully applied flannel bandage, thus denoting a great degree of weakness in the part. The patient stated, that, about a month before admission, while walking down to Leith, he had strained the knee, and, in consequence, almost immediately afterward perceived a beating tumor in the ham.

The artery was tied on the 30th of April, and though no unpleasant symptoms followed, the swelling was slow in undergoing absorption; so that, when he was dismissed on the 3d of June, there still remained

some enlargement of the limb. He nevertheless was able to resume his employment, and perform a full share of active duty; but about a fortnight ago observed a swelling in the calf of the leg, which has since opened spontaneously, and discharged a large quantity of matter, mixed with coagulated blood—no doubt the remains of the extensive effusion which existed previously to the ligature of the vessel.

The first of these cases is curious, from the spontaneous cure occurring while the aneurism was still small and circumscribed, and the circumstances consequently unfavorable for coagulation. The second case was very similar to it, and I delayed the operation for a fortnight, to afford the chance of recovery without its performance, which might be derived from perfect rest and the pressure of a bandage. The third case seemed rather unfavorable, from the large size and sudden extension of the swelling; and the recovery was accordingly much slower than usual, though ultimately effected. It has been a question whether an early or advanced stage of the disease is more favorable for success, the undilated state of the anastomosing vessels being considered adverse in the former, and the quantity of extravasated blood an obstacle in the latter. From all that has fallen within my own observation, I should have no hesitation in preferring to operate at an early period, having never witnessed in my own practice the slightest unpleasant symptom of defective circulation, however small and recent the tumor might be.

Of all the operations performed for aneurism, ligature of the femoral artery is, I believe, justly regarded the easiest, either on the dead subject or on the living body, and yet the bad consequences which attend it are distinguished by their severity as well as frequency. For my own part I have been fortunate, having tied the vessel seven times for aneurism with success. But within the period of doing so, I am not aware of any case that has terminated favorably in this city, while I have either seen or heard of four that ended badly, viz: one by inflammation of the vein, one by mortification, one by hemorrhage, and one by amputation. It is usual to attribute untoward occurrences to some peculiarity in the constitution of the part or patient; and there can be little doubt that varieties of this kind may have some influence over the result. But I feel quite sure that attention to some minute points in performing the operation, has a much larger share in determining whether it shall be favorable or unfavorable.

It is established that the great sources of danger from the ligature of large arteries, are undue laceration and separation of the connections of the vessel, whence hemorrhage is apt to ensue; and injury to the coats of the veins, which is apt to occasion inflammation, and an obstructing coagulation, causing mortification of the limb. The subcla-

vian artery, when tied at the external edge of the scalenus, lies at some distance from the vein, and neither the carotid nor the external iliac artery, adheres so intimately to its accompanying venous trunk, as to render it at all difficult or dangerous to pass the needle. But the femoral artery has a closer connection with the vein, and though it is felt by the operator's finger, after the fascia has been opened, round and distinct, and as if insulated from the surrounding parts, except by the loosest connections, any attempt to pass the ligature, without further dissection, either proves abortive, or, if executed by force, exposes the patient to the greatest danger. I have seen a gush of dark colored blood proclaim transfixion of the vein ; I have seen on dissection a portion of this vessel included in the ligature ; and I have also seen the external coat alone grazed, as it were, by the needle, but nevertheless excited to fatal inflammation. If, on the other hand, this danger be avoided by using blunt instruments or the finger, to detach the artery from its connections, the patient is exposed to the hardly less disastrous consequence of hemorrhage, through ulceration or sloughing of the vessel.

To tie the femoral artery safely, the surgeon should be impressed with the conviction that the operation is one not of difficulty, but of great nicety. He should make an incision between two and a half and three inches long in the proper situation, cut through the fascia to to a smaller extent, and expose the sheath of the vessels. So far he can hardly go wrong ; but then, instead of hastening to pass his needle, he should, by ligature or the temporary application of spring forceps, close every little vessel that discharges enough of blood to obscure distinct vision of the object he has in view. Let him now seize the sheath with dissecting forceps, and, gently raising it, make a small opening by means of a straight narrow sharp-pointed knife. The cellular and fatty substances which envelop the vessels in variable quantity, are next to be elevated and divided in successive portions, until the external coat of the artery appears quite distinct and *white*, when the needle may be passed without the slightest difficulty or danger. I am quite aware that instructions to the same effect are contained in the common books of surgery ; but believing, for the reasons above stated, that sufficient attention in practice has not been bestowed upon them, I think it right thus seriously, and diffusely as it may seem, to repeat and enforce these directions.

Case IV.—William Garrick, aged seventeen, from Shetland, was admitted into the hospital on the 20th day of May, on account of an aneurism of the femoral artery. He stated that, in the latter part of February, when cutting a piece of wood with the large knife used by seamen, he had accidentally thrust the blade into the inner side of his

left thigh, a little below the middle. A great gush of blood immediately sprung out, but was speedily arrested by the pressure of four half crowns which he had the presence of mind to apply firmly over the wound. In a few days, the bandage being taken off, it was found that the wound had healed, and nothing unusual was noticed until a week afterward, when he perceived a sort of thrilling sensation at the injured part. This increased daily, and in the course of another week, a pulsating tumor, the size of a small hen's egg, was noticed; he still took no alarm, but, finding that the tumor progressively increased, at length applied to a surgeon, who explained the nature of his case, and sent him off to Edinburgh.

When admitted, he complained of coldness in the limb, which was also slightly œdematous, notwithstanding the support of a flannel bandage which had been put on before he left home. The tumor was about the size of a goose's egg, had a strong uniformly-distending pulsation, though not very distinctly defined, and lay under the lower edge of the sartorius. The sac could be readily emptied by pressure, either directly over it or on the trunk of the artery at the brim of the pelvis, so as to make all trace of the swelling disappear.

It was thought in this case, that simple ligature of the femoral would not prove sufficient for effecting a cure; and that, as in brachial aneurism, from wounding the artery in venesection, it would be necessary, after opening the sac, to tie the vessel on both sides of its aperture; but for my own part, I did not despair of success, from merely obstructing the artery above the tumor, since the anastomosing circulation beyond it was much less free than at the bend of the elbow. At the same time, I greatly dreaded the danger of conveying ligatures round the artery, where it lay within the sac, in close proximity to the vein, or not improbably almost incorporated with it by the pressure of the blood. I therefore resolved to try the effect of simply tying the femoral in the ordinary way, as this proceeding seemed to be safe in itself, and in the event of failure, promised to present no obstacle to adopting the other alternative.

The operation was performed on the 26th; the pulsation ceased immediately and completely without any return; the swelling diminished daily; the ligature separated on the 14th of June (the eighteenth day); and the patient went home cured on the 23d day of the same month.

Case V.—Jane Wood, aged sixty-two, was admitted on the 9th day of April. She had suffered a simple fracture of the tibia and fibula, which through careless treatment became compound, with extensive suppuration and undermining of the integuments and muscles. About the middle of May, the sore took on a sloughing

disposition, and rapidly enlarged, exposing the tendons and united bones. On the 1st of June, a sudden gush of blood took place from the situation of the posterior tibial artery, but ceased immediately through the application of cold and elevation of the limb. In the middle of the following night, at least two pounds of blood were lost before the house surgeon could be summoned; and as the hemorrhage then did not continue, slight pressure merely was applied. At nine o'clock the following morning (the 2d), blood gushed out as violently as ever, and firm compression was effected over the part from which it proceeded. I was then sent for, and tied the femoral artery in the usual way, above the crossing of the sartorius. The following extracts from the hospital journal will show the patient's subsequent progress:

"*June* 15.—From the day the artery was tied, there has been no bleeding; the foot has remained of good temperature; and there has been no extension of the sloughing. The sloughs are now nearly all separated, and the sphacelated tendons were to-day divided, to keep the foot at rest, as the fracture was constantly disturbed by twitching of the muscles. Little or no union has taken place between the bones, but the limb is retained in a good position, being laid on its outside in a leather splint, with the knee bent. *The wound made on tying the artery united by the first intention, without discharging a drop of matter.*

"*July* 22.—The wound is contracting steadily. Union is distinctly taking place in the fracture, and the general appearance of the patient is greatly improved.

"*September* 1.—The bones are firmly united, and the sore is nearly healed. She has been out of bed several times, and takes her food well. The ligature separated on the thirty-eighth day."

The recovery of this emaciated, unhealthy-looking old woman, under the circumstances now detailed, was certainly very unexpected and surprising. It ought, I believe, to be ascribed chiefly to the unremitting attention of Dr. Mackenzie, my clerk in the hospital, under whose immediate care she was after the fracture became compound.

Case VI.—Archibald Hamilton, aged twenty-five, was admitted on the 26th of August, on account of a popliteal aneurism. He stated, that pain in the left ham had been felt for about five weeks, but the tumor only for three, and that it had not increased in size, except slightly, during the last week, when, in the course of his employment as porter, his foot slipped while he was descending a trap stair. The swelling was found to occupy the hollow of the ham completely. It was circumscribed, and pulsated strongly. The artery was tied on

the 30th; the ligature separated close to the knot on the 6th of October. He was dismissed cured on the 27th.

Case VII.—Robert Anderson, aged thirty-three, was admitted on the 15th day of February. He stated that his employment consisted in loading the canal luggage-boats, and that, in the course of it, he had frequently occasion to leap ashore with all his force. About a month before, his right leg had suddenly become stiff, benumbed, and swelled below the knee, but did not prevent him from discharging his duty during the following fortnight, at the end of which he for the first time noticed a pulsating tumor in the ham. He then applied a poultice, and sent for a surgeon, who told him the nature of his complaint, and made him keep quiet in bed. Finding no improvement, he entered the hospital, to undergo the operation requisite for his relief. There was then still some œdema of the leg, and congestion of the veins below the knee. The aneurism was circumscribed, but filled the popliteal space. It pulsated strongly, and could be emptied by pressure on the femoral artery. I performed the operation on the 17th. On the 27th of March the ligature separated close to the knot, and on the 31st he was dismissed cured.

Case VIII.—John Pearson, aged forty-two, was admitted on the 13th day of July, on account of a popliteal aneurism, which completely occupied the right ham. He stated, that in the course of his employment as a plasterer, he was going down a ladder about six weeks before, when, without being conscious of straining, or otherwise hurting himself, he suddenly felt the right foot and ankle stiff, and in going home, observed them to be slightly swollen. He continued at his work for several days, but then noticed a tumor in the ham, and confined himself to bed.

The artery was tied on the 19th, the ligature separated on the 13th of August, and he was dismissed, cured, on the 12th of September.

These cases of popliteal aneurism show how insidiously the disease commences, since there can be no doubt that in all of them it had existed much longer than the patients supposed. Aneurism, wherever situated, does not appear to be in itself the source of painful sensations, or, until coagulation is far advanced, to affect the circulation in any material degree. It is only when the tumor becomes so large as to press injuriously upon the neighboring parts, that symptoms of appreciable importance present themselves. In these, there will, of course, be some variety, corresponding with the difference of organs and textures concerned; but from the nearly constant vicinity of large veins and nerves, the predominant signs are usually œdema, coldness, and pain. The absence of characters apt to attract the attention of

patients in the early stage, should not be lost sight of in the diagnosis of the disease. I once operated upon a major of dragoons, who had unquestionably labored for many months under aneurism of the ham, without being aware that he did so, or relinquishing his professional duties, and who actually followed the hounds, with unabated energy, the very day before the existence of a large pulsating tumor was ascertained. In another case which came under my care, the patient, a captain in the army, had been treated, during six months, for sprain of the ankle, before it was discovered that he suffered from a popliteal aneurism, though in all probability it had originated from the same exertion that injured the joint, in leaping from the summit of a rotten paling in the pursuit of partridges which his dog had pointed.

In two of the cases, it will be remarked that the ligature separated at the knot, leaving the noose which surrounded the artery. This was owing to the length of time the thread remained in the wound (thirty-six and forty days), and that again must be ascribed to the small amount of local disturbance caused by the operation. The more the artery is detached, and the more its neighboring textures are torn or contused, the more rapidly and extensively does ulcerative absorption ensue; and when hemorrhage takes place, it is almost sure to do so within sixteen days from the date of the operation. Slow separation of the ligature, therefore, augurs safety; and if the thread remain so long as to rot, and leave a portion in the wound, it does not appear that there is reason to apprehend any troublesome consequence; but if separation of the entire ligature should be particularly desired, it will be proper to twist the thread a little every day after the end of the third week.

In some remarks on the ligature of the femoral artery, published in the first number of the Edinburgh Journal (1841), the object of which was to enforce the importance of some minutiæ in the process, I stated, that in no instance had any of my patients suffered the slightest bad consequence from the operation, and I am still able to say so. It is true, that in one case, the aneurism, being large and diffused, was not cured, though dissection, eight months afterward, showed that the artery had been obstructed for several inches at the part where the ligature was applied. But this result, of course, has nothing to do with the success of the operation for obstructing the vessel.

Case IX.—David Dand, a stout, healthy-looking boy, nine years of age, was admitted on the 19th of February, recommended by Dr. Lumgair, of Largo, to undergo the operation for popliteal aneurism. The tumor extended from the lower part of the popliteal space under the bellies of the gastrocnemii muscles, so as to distend the calf of the leg. When examined by the hand, it was felt quite

circumscribed, and pulsated distinctly. The swelling disappeared entirely under moderate compression, and quickly returned when the pressure was withdrawn. The same effects resulted from temporary compression of the femoral artery. It was stated that the disease had been first noticed about two years before, soon after the boy had completed his seventh year, and that it had occasioned little uneasiness, but that the swelling had latterly enlarged with increasing rapidity, so as to excite alarm for the consequences of its progress if allowed to proceed unchecked.

I tied the femoral artery on the 24th; no unpleasant symptom was caused by the operation, immediately after which the pulsation ceased, and the swelling could no longer be felt. In its place, however, there was soon to be perceived a solid tumor of coagulum, which gradually increased in firmness, and diminished in size. The ligature came away on the 4th of March (the fourteenth day), and the patient was dismissed on the 21st.

The age of this patient at first led my colleagues and myself to entertain doubts as to the disease being truly an aneurism, similar to what is met with in adults. But the diagnostic characters were so well marked, that we decided on tying the artery; and the effects of the operation most satisfactorily demonstrated that the nature of the case was really no other than it had appeared to be. Sir A. Cooper has stated,* that the earliest age at which he had met with aneurism, was eleven years, the patient being a boy in St. Thomas' Hospital, and the artery affected the anterior tibial. A gentleman who attended my lectures last winter (Dr. Peach), told me that he had witnessed the amputation of a child's thigh for popliteal aneurism of very large size; and another gentleman, whom I had the pleasure of regarding as a pupil at the same time (Dr. Croft), mentioned that he had seen in the museum of an English provincial hospital the preparation of a carotid aneurism, for which the artery had been tied without success, in a child of seven or eight years of age. But I am not acquainted with any instance of aneurism being remedied by the modern operation, at so early a period of life as in the case just related.

It may here be not improper to notice the attempt which has lately been made to introduce compression of the femoral artery instead of its ligature for the treatment of aneurism. In the earlier part of the present century, before the principles on which arteries may be tied with safety had been established, while ligatures of reserve, rolls of plaster, and broad tapes were employed for the purpose, and no harm was anticipated from extensively detaching the vessel to be tied from its neighboring connections, various instruments were contrived for

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*Lectures on Surgery, Vol. ii, page 41.

pressing upon the femoral artery * without impeding circulation through the limb, and repeatedly employed with success in cases of popliteal aneurism. But the suffering endured by the patients was so severe and prolonged, during the tedious process of recovery thus accomplished, that we find surgeons in whose hands this method had proved successful, preferring to it the Hunterian process, with all its early imperfections, or even encountering the horrors of the old operation, rather than inflict the permanent agony of the screw. The sensation caused by continued pressure over the vessel, however carefully applied, if sufficiently forcible to prove effectual, is of a peculiarly intolerable kind, and must be endured for a space of time not to be reckoned by minutes, or even hours, but by days, weeks, or months. Formidable consequences also occasionally occur, in the shape of ulcerations, and sloughs, or swelling of the limb. And there can be little doubt, that if the method in question were generally adopted, so as to bring under its influence the variety of constitutions which are prone to resent such treatment, there would not be wanting even fatal results to strengthen the objections that might be urged against its adoption. It should be kept in view, that the field for resorting to the use of pressure is limited to the femoral artery, as the superior extremity is liable only to traumatic aneurisms, which are best treated by double ligature of the wounded vessel, while the carotid, subclavian, and iliac arteries are placed beyond the reach of compression. But the femoral artery may be tied with so much ease, so little suffering, and such perfect safety, that the laborious, distressing, and tedious procedure, which has lately been brought again into notice by a surgeon of Dublin, will probably soon return to the obscurity in which it had very properly been allowed to slumber. For my own part, having tied the femoral artery thirteen times for aneurism, and never met with the slightest symptom of an unpleasant nature from the operation, I see no reason to deviate from the line of practice hitherto pursued.

Case IX.—Walter Brown, aged forty-two, a cooper in Leith, was admitted into the hospital on the 22d September, on account of a popliteal aneurism, which occupied the hollow of the right ham completely, but was distinctly circumscribed. It had been first noticed about two months before, and being then of a considerable size, may have existed for a longer period.

He could not explain how the disease originated, farther than by stating, that in his employment vigorous exertion of the limbs was frequently required.

The artery was tied on the 2d of October, with hardly any com-

* Boyer, Traité de Malad. Chirurg., Vol. ii, page 234.

plaint on the part of the patient, and the loss of not more than a teaspoonful of blood. No painful sensation or any other unpleasant symptom followed, and the patient lay perfectly easy and tranquil, until the ligature separated on the thirty-sixth day; the aneurismal tumor having by this time almost entirely disappeared. The patient was then allowed to resume the use of his limb, and left the hospital on the 9th of November.

In the case now related I tied the femoral artery for the *sixteenth* time, without experiencing any bad effects from the operation. Much blame has been imputed to me, both publicly and privately, for adhering to this mode of treatment, in disregard of the pressure system, which has lately been revived, and I am told that, whatever may have been my own good fortune in escaping unfavorable results, it is not justifiable for me as a teacher of clinical surgery, to pursue a practice which has proved in general very dangerous, while there is another that may be adopted with perfect safety. To remonstrances on such grounds respectful attention is due; and I have therefore deemed it my duty to make a careful inquiry into the present state of the question, illustrated, as it has been, by the accumulated facts of several years.

With regard to the ligature, it appears that this operation admits of being performed so as to be nearly, if not entirely, free from danger. I have undertaken it in every case that presented itself, although the circumstances were often very unpromising, and even when erysipelas as well as hospital sore infested the clinical wards of the Royal Infirmary. Mr. Busk, surgeon of the Dreadnought Hospital Ship, also, as will be seen from the subjoined letter, has tied the artery nine times without any bad effect; so that the operation has thus been performed in twenty-five cases with no unpleasant consequence. This success can not be ascribed to mere good fortune, and certainly has not depended upon any peculiarity in the process, or its performance, which may not be generally adopted.

There is now, I believe, no difference of opinion as to the proper principles of the operation. They are, 1. To dissect with the knife and forceps, instead of tearing or scratching with a blunt instrument, to expose the artery. 2. To denude no more of the vessel than what is requisite for passing the needle. 3. To use for ligature the smallest silk thread possessing sufficient strength, and tying it tightly as possible. 4. To treat the wound so as to favor union by the first intention. As to the performance of the operation, I believe that there is no arterial trunk in the body which requires for its ligature so little anatomical skill, or manual dexterity, as the femoral artery. The angle formed by the sartorius and adductor longus affords a sure guide to the vessel; and in the event of any error as to the position

of the external incision, the fibers of these muscles, by their different directions, at once show the operator on which side he has exceeded. But while the mere detection of the artery is abundantly easy, it must be admitted that the subsequent part of the operation is beset with extreme danger from any want of caution or nicety, since, if the vessel be roughly detached from its connections, hemorrhage will probably result; and if the vein be wounded, the patient will almost certainly perish from inflammation of the vessel, or mortification of the limb. Care is always required, and must be employed in a degree proportioned to the intimacy with which the artery is connected to its neighboring parts. I have completed the operation in less than a minute, and on other occasions have found nearly half an hour requisite for the purpose. If all operators had paid as little regard to the time occupied, I believe that the unfavorable results on record would not have been so numerous as they are. The operation, therefore, I believe, being performed upon proper principles, and with sufficient care, may be regarded as perfectly safe.

If this position be well founded, the grand argument in favor of compressing, instead of tying the artery, has no room to stand, since the danger alleged to attend ligature of the vessel is what gives importance to a mode of treatment claiming to be altogether free from risk. But I, some years ago, expressed the fear that compression, when tried in a variety of cases, would not be found quite so safe as its advocates anticipated. "Formidable consequences also occasionally occur, in the shape of ulcerations, and sloughs, or swelling of the limb, and there can be little doubt, that if the method in question were generally adopted, so as to bring under its influence the variety of constitutions that are prone to resent such treatment, there would not be wanting even fatal results to strengthen the objections that might be urged against its adoption."* It may now be inquired how far this anticipation has been realized.

Case X.—The following case, reported by Mr. Bellingham, affords an example of the bad effects that may proceed directly from compression, and it is hardly necessary to remark that the "acupuncture" employed in its progress nowise affected the result:

"Patient, a butcher, aged thirty-eight, unhealthy, laboring under anasarca, anemia, and enlargement of the heart, with signs of valvular disease, admitted into St. Vincent's Hospital, under Mr. Bellingham, February 10, with popliteal aneurism upon the left side. Patient is accustomed to carry heavy loads, but never received any injury; tumor noticed about eight months previously, soon after which he

* Monthly Journal of Medical Science, October, 1844.

entered another hospital; compression was used, but he left it about the middle of last December. The aneurism is about the size of a hen's egg; it diminishes, but does not disappear on compressing the artery in the groin; the limb is œdematous.

"Compression commenced soon after the patient's admission; pressure made by a weight in the groin, and by a clamp upon the artery at the junction of the middle with the lower third of the thigh. After the compression had been continued for some time, as the pulsation continued to be strong, it was resolved to give a trial to galvanism combined with compression. By applying pressure upon the artery above and below the aneurism, so as to retain the contents of the sac until acted on by the galvanic current, it was expected that one of the principal causes of the failure of this proceeding would be avoided; the case likewise seemed to be a favorable one, in this respect, that the blood contained a very large amount of serum in proportion to the fibrin.

"*April* 21.—A clamp was applied upon the artery above the aneurismal sac, and another below it; two acupuncture needles (insulated except at their points and hafts) were then introduced from opposite sides into the aneurismal sac, and brought into connection with a Smee's battery by Dr. Apjohn, professor of chemistry to the Royal College of Surgeons, who kindly afforded his services, and the galvanic current was maintained by him for about fifteen minutes at intervals. It was intended to repeat the application after a short interval, and in the meantime the patient continued the compression. In order to hasten the cure (as he thought) he had kept up very strong pressure upon the artery in the thigh for many hours, when, seven days after the employment of the galvano-puncture, he was seized with a shivering, erysipelas (which was prevalent at the time) attacked the part of the thigh upon which the pad of the instrument rested; it spread upward and downward, and the patient died on the 4th of May, six days afterward."*

The following case, kindly communicated to me by Mr. Busk, shows that in unfavorable circumstances the defective circulation caused by compression may prove fatal to the limb:

Extract of a Letter from George Busk, Esq., to Dr. Stewart, Deputy Inspector of Naval Hospitals, dated Greenwich.

"I am very glad to furnish you with the particulars of the case of popliteal aneurism treated by pressure upon the artery, for Mr. Syme's information. Though little can be said on the subject from a single case, and that in some respects exceptionable, I quite agree with him in thinking that the new mode of treating aneurism in the

* Dublin Med. Press, Oct. 14, 1846, p. 246.

ham, offers but little or no advantage over the Hunterian operation, when skillfully performed. It is more tedious, and, on the whole, undoubtedly more painful, and, as the present case shows, is not free from one at least of the same risks as attend the operation of tying the artery, viz: gangrene of the limb, from the stoppage of the circulation, gradually as it appeared in this case to have been effected.

"Case XI.—J. B., aged twenty-nine, was admitted on the 11th day of December; a man of healthy aspect, and who had always enjoyed good health. He complained of painful swelling of the whole of the left knee joint, which was distended evidently with synovial effusion; but, on stricter examination, an aneurismal tumor, about the size of a goose's egg, but flattened, and with a powerful thrilling impulse, was detected in the popliteal space. The affection appeared, from his account, to have commenced without assignable cause, and with a pungent pain in the ham, on the 30th of November, or twelve days only previously. Pressure on the femoral readily stayed the pulsation in the tumor, which was then almost wholly dispersed. The knee-joint, however, was permanently distended with fluid effusion, and was painful on motion. I determined, in what seemed such a favorable case, to employ the mode of treatment by pressure, which was adopted in the following mode:—The limb was carefully bandaged from the toes up to the groin, with a long narrow firm pad, along the course of the femoral artery, and with a broad wooden splint applied on the back of the thigh, upon which splint one extremity of the Italian tourniquet was fixed, and the other, brought round the outside of the thigh, pressed upon the superficial femoral a little above Scarpa's angle, and a few turns of the screw sufficed to command the artery completely, without compressing any other part of the limb. The handle of the instrument was committed to the patient's own care, with directions to turn it one way or the other, as his feelings of pain induced him. The pressure which he kept up, without causing himself any pain, was not at all times sufficient to stop the pulsation in the tumor, though he usually effected this for some part of the day, but merely materially to lessen it. No particular change took place for several days, at the end of which, however, it was found requisite to relax the bandages on the limb, owing to the tension produced by the tendency to swelling, apparently arising from pressure on the femoral vein. This relaxation relieved the pain everywhere, except in the knee, which continued painful and much swelled. The tumor remained stationary, and, at the end of about ten days, the pulsation in it was much less powerful, and it appeared to be becoming solid. The man never complained of the pressure of the tourniquet, which was completely under his own control; but about this time he began to feel

considerable pain in the foot and inside of the leg, which seemed to be referable to the course of the saphenus nerve. He became feverish, and had one or two chills, but there was nothing very remarkable till the fourteenth day after commencing the application of the pressure, on which morning, pulsation could not be at all felt in the now solid remains of the much diminished tumor. The knee was much swelled, red, and painful, and a suspicious-looking white spot had made its appearance on the dorsum of the foot. The pressure of the tourniquet, which had been almost nothing for twenty-four hours, was entirely removed, and assidious friction of the leg and foot was kept up, with fomentation to the knee. The gangrenous spot, however, by evening, had become more decided, and rapidly increased, and on the following day, the whole leg, about half-way up the calf, was cold and insensible, and very rapidly fell into complete gangrene. This gangrene then extended more slowly nearly up to the knee, and, in the course of two or three days, appeared inclined to reach no further. He complained still very much of the knee, and I consequently thought it advisable (though, under the circumstances, very reluctantly) to remove the limb in the lower third of the thigh. The man, however, scarcely rallied from the shock of this operation, and died in about four days with diffuse gangrene of the lungs.

"The femoral artery, at the site of pressure, presented no sign of alteration, and seemed to be of the natural size downward. In the ham, was a firm, hard, aneurismal tumor, about the size of a hen's egg, situated on the anterior aspect of the artery, with which it communicated by a large ragged opening. The cavity of the sac was occupied, in great part, by firm, laminated, fibrinous coagula, and quite in the center by a softer, grumous clot. The cellular tissue surrounding the tumor, was infiltrated with pus, and the capsule of the knee-joint was perforated by a small ulcerated opening, caused evidently by the pressure of the aneurismal tumor. The joint contained a large quantity of turbid synovial fluid, and the synovial membrane, except on the cartilages, was minutely injected.

"From this short account you will observe, that the gangrene of the limb was probably coincident with the cessation of the flow of blood through the aneurismal sac and popliteal artery, the collateral circulation, at the same time, not having been satisfactorily established, owing perhaps to the morbid condition of the textures surrounding the knee-joint. It is, of course, impossible to say whether, under these circumstances, the old operation would have been attended with a more happy result; though I am inclined myself to think that it would, principally for the reason that the mischief in and about the knee would, in a great degree, have been prevented by an earlier dispersion of the aneurism. I have tied the femoral artery nine times—eight for

popliteal and once for femoral aneurism, and always successfully, as far as the operation was concerned; that is, I never had secondary hemorrhage nor gangrene. In the femoral aneurism, the sac suppurated, and the man died some months afterward, worn out by the discharge and other disease; and in one case of popliteal (diffused), amputation of the limb was required, eighteen months or two years afterward, in consequence of gangrene (slow) of the foot, after exposure to cold. The others were completely successful, and the average time of confinement to bed about fifteen or sixteen days. In my opinion, the operation is less painful, and attended with as little risk, when properly performed, as the mode of treatment by pressure."

The following case, I think, tends to show that, in a patient laboring under complicated disease of the circulating system, prolonged obstruction to the flow of blood through so large a portion of the body as the whole inferior extremity, may prove seriously hurtful. The advocates of pressure are accustomed to assert, that the sudden obstruction caused by ligature, must occasion much more inconvenience than the gradual effect of pressure. But this statement is altogether opposed to experience; and although we may not be able to explain it fully, there can be no doubt of the fact, that infinitely less disturbance, either locally or generally, results from the complete stoppage effected by ligature than from merely impeded circulation, whether caused by external pressure, or produced by swelling in the interior of a limb.

"Mr. Newcombe now produced the morbid specimens, including the heart, which were taken from the individual just alluded to by Mr. Cusack, as having been the subject of the popliteal aneurism which had been treated by compression. The man, aged thirty, as Mr. Cusack had observed, died very unfortunately just as the cure was effected. He was admitted to Steevens' Hospital about a month since, laboring under popliteal aneurism, having at the same time strong and violent action of the heart, so much so, that all the superficial arteries could be seen pulsating, exhibiting a well-marked aneurismal diathesis. Immediately after his admission to the hospital, pressure was applied to the femoral artery in the same manner as had been done in other cases which were recently before the society. He became so restless from its effects (though he was watched most carefully), that it was resolved to discontinue its use for some days. Examination with the stethescope had detected the presence of patency of both semilunar and mitral valves, accompanied with considerable hypertrophy of the left ventricle. He was now left quiet for ten days, the pressure having been resumed, however, a fortnight before his death. On the ninth day after the reapplication of the pressure, symptoms of improvement (which hitherto had been trifling indeed) were manifest. Slight thickening of the sac had been previously observable at times, but it always

disappeared in a few hours. Toward the evening of last Monday, the sac had increased in thickness, and the pulsation in the tumor was much weaker when even a moderate degree of pressure was kept up. On Wednesday the tumor was completely free from pulsation, though the amount of pressure was very slight. However, the instruments were left on till Friday evening, when he died in the sudden way described by Mr. Cusack. This case possessed a considerable degree of interest, inasmuch as even with the unfavorable condition of the heart and arteries displayed by the preparation on the table, a complete cure has been effected, as the society could see in the preparation of the tumor now before them. The tumor, he observed, was now considerably smaller than when the treatment had been commenced. The artery was pervious down to within one-fourth of an inch of the tumor; it was there filled by a firm coagulum, which extended into the sac, and completely filled it. The sac was at the anterior part of the artery, and communicated with the latter by a large round opening, which may perhaps account for the length of time the coagulum took in forming. The patient had suffered a good deal from pain and tenderness in the tumor, which the fact of a nerve passing directly over the tumor will account for. Both anterior and posterior tibial arteries were pervious, and appeared to carry on their usual functions. The pressure had been chiefly confined to the portion of the femoral artery near the origin of the profunda; here some slight thickening of the cellular tissue surrounding the vessel was observed, but there was no change whatever visible in the vessel itself. The heart was much enlarged; great hypertrophy of left ventricle. The carneæ columnæ would be also seen very much larger than was natural. The arch of the aorta was dilated and somewhat thinner than usual; on looking down from it to the semilunar valves, an open space may be seen, the valves being thin and weak. The mitral valves contained some hard deposits, and are also slightly patent. The left ventricle and the arch of the aorta contained fluid blood at the time of the examination, which was made about six hours after the death of the patient." *

It will be remarked that this patient was rendered "restless" by the pressure, and died forty-eight hours after pulsation ceased to be felt, while the tourniquet still remained applied to the limb. Yet, in a tabular statement by the editor of the Dublin Medical Journal,† this case is entered as "Cured;" and in another notice of it by the same author, the patient is said to have "died suddenly of disease of the heart before leaving the hospital." Indeed, there appears to be some peculiarity in the Dublin reports on this subject, since, with regard to

* Dub. Med. Press, April 30, 1845, page 275.

† Dub. Jour. of Med. Science, Aug., 1846, page 129.

another case, it is said, that "after recovery, the popliteal artery of the affected limb pulsated as strongly as that of the sound one," which is plainly quite impossible, if there really had been an aneurism.

Independently of the danger that might proceed directly from compression, I regarded the risk of failure as a very serious objection to this method, not merely with reference to its rendering profitless the patient's suffering and confinement, but still more on account of the difficulty that might afterward be experienced in performing the operation, from thickening and condensation of textures caused by the pressure. Many instances of failure have come to my knowledge, and I am also credibly informed, that the apprehension just expressed has been fully verified by experience. But as the operators have not thought proper to publish their cases, they can, at present, be only referred to in a general way, as confirming this opinion, which, indeed, requires no further support than what is afforded by Mr. Cusack's case, already related, as in it there is the evidence of dissection, that "thickening of the cellular tissue surrounding the vessel" may result from even a comparatively moderate degree of pressure. On the whole, there is reason to believe that the ligature, when properly performed, is safer than compression. But I need not insist upon this reason of preference, and may next inquire into their relative superiority, with reference to the respective degree of facility and suffering that attends their employment.

The ligature is usually accomplished in two or three minutes, without any trouble to the operator, and hardly any pain to the patient, who after the skin is divided, seldom expresses more than a slight feeling of uneasiness; and even when difficulty is experienced in detaching the vessel, the operation, though protracted in duration, is attended with little additional pain. If the sheath of the vessel be opened on the outer or fibular side, by slightly withdrawing the edge of the sartorius muscle, there is little risk of cutting any arterial branch, and the hemorrhage seldom exceeds one or two teaspoonsful. The wound generally unites by the first intention, and when it does not do so, heals by granulation without pain or inconvenience. The patient during his confinement lies in perfect tranquillity, sleeping soundly, taking with appetite the food given to him, and able to be amused by reading, writing, or conversation.

Pressure on the trunk of an artery sufficient to arrest or impede the flow of blood through it, notwithstanding all that has been done by mechanical contrivance to lessen the inconvenience of its effects, must always be more or less distressing to the patient, by the local uneasy feelings and general commotion of the system which it occasions. Few, indeed, would submit to it, except through their dread of an operation represented to them with alarming features; and not

a few have insisted upon encountering the knife, notwithstanding all their apprehensions, rather than prolong their martyrdom under the tourniquet. In twenty-three cases of aneurism, reported by Mr. Bellingham, from the practice of seventeen surgeons, as successfully treated by pressure, I find that the average duration, not of the treatment, but of the actual compression, excluding the intervals of its discontinuance, amounted to thirty-eight days. Thirty-eight days and nights of misery to escape a few minutes of trivial uneasiness!

The question between ligature and compression seems very much the same as that between passing a catheter and puncturing the bladder for retention of urine. If the surgeon can with safety relieve his patient by means of the catheter, he should certainly do it. But if, instead of drawing off the water, he can in this way only lacerate the urethra, and make false passages through it, his duty is plainly to thrust a trocar into the bladder. Now, as it is not likely that all the gentlemen I have from year to year the honor of addressing in my lectures, will be able, throughout the whole course of their practice, to avoid puncturing the bladder; it may be thought improper for me, during seventeen years' discharge of hospital duty, to have never resorted to this operation—even in a single instance. But while a clinical teacher has to regard the interest of his pupils, as well as those of his patients, the former must always be held secondary to the latter. If it is in his power to afford relief by the catheter, he is bound to do so; and, on the same principle, so long as it is my sincere persuasion that ligature of the artery is preferable to pressure, for the cure of popliteal aneurism, I shall deem it my duty to pursue this method, though it may, perhaps, be the best adapted for the lowest capacity of surgical practice. Puncture of the bladder and compression of the femoral artery may be useful expedients when circumstances forbid the adoption of better means; and I am far from desiring that either the one or the other should be excluded from the practice of surgery; but it would surely be unreasonable to insist upon these clumsy, painful, and I will add dangerous, methods of treatment being employed upon all occasions, instead of those which, when properly executed, are easy, gentle, and safe. Puncturing the bladder is certainly better than leaving the patient to his fate, or aggravating it by mischievous poking with catheters; and compression of the artery is undoubtedly better than its rude or careless ligature. Let every man act according to his ability; but let no one who feels it necessary to choose inferior means, throw blame upon those who feel warranted to practice a higher exercise of their art.

LIGATURE OF THE ARTERIES BELOW THE KNEE.

Aneurism hardly ever occurs below the knee from internal causes; but wounds not unfrequently occasion hemorrhage, which requires the arteries concerned to be tied. In such cases it is necessary to secure the injured vessel not only above the aperture, but also below it, since the anastomosing branches would otherwise maintain the bleeding.

The posterior tibial may be exposed by making an incision along the inner margin of the tibia, commencing opposite to the insertion of the sartorius, and running three or four inches downward. The knee being bent, and the foot extended in order to relax the gastrocnemius, the origin of the soleus from the tibia should be brought into view and divided, when the operator may pass his finger down to the artery, which lies somewhat more than a finger's breadth from the edge of the tibia, immediately under the fascia, that covers the deep-seated muscles, and then either apply ligatures or a succession of graduated compresses. This artery may be tied very easily at the ankle. An incision about a couple of inches long should be made between the inner ankle and *tendo Achillis*, rather nearer the former than the latter; two layers of fascia, which are the continuations of the superficial one lying immediately under the integuments, and the deep one that covers the bloodvessels, nerves, and deep-seated muscles, with more or less intermediate cellular substance and fat, must next be divided, and then the artery is found lying with its two *venæ comites* on the tibial side of the nerve. The plantar arteries are frequently cut, and would be tied with great difficulty, owing to the cellular and fatty textures which cover them being so thick and dense, especially when infiltrated with blood; but it is fortunately unnecessary to secure them in this way, as pressure properly applied is always sufficient for the purpose. The lint ought to rest directly upon the orifice of the bleeding vessel, and therefore, as has already been remarked, the wound should be dilated, if not wide enough to admit of its introduction.

The anterior tibial artery is liable to wounds at various parts of its course, and may be tied throughout almost the whole of it. This is not required below the ankle, as pressure is equally efficient, and much more convenient; but it may be necessary to apply ligatures higher than this. The vessel is not apt to be wounded farther up than the middle of the leg, where the thickness of the muscles protects it. As it runs close to the interosseous ligament, and along the fibular side of the *tibialis anticus*, it may be always easily found by making an incision about two inches and a half along, at such distance from the outer margin of the tibia as will allow room for this muscle, and then cutting down in the first muscular interstice.

The peroneal artery is so securely defended by the various parts which surround it on all sides, that it can hardly be injured without a very serious wound of the leg, and in the rare case of its hemorrhage requiring particular attention, instead of performing a very severe operation to apply the ligature,* it would probably be better to enlarge the wound, if necessary, introduce graduated compresses, and support the limb with a bandage applied from the toes upward.

FEMORAL, INGUINAL, AND ILIAC ANEURISM.

Aneurism sometimes affects the femoral artery just before it passes through the sheath of the triceps, in which case the vessel ought to be tied above the crossing of the sartorius, as has been described for popliteal aneurism: or, if the aneurism is of the false kind, and the result of a recent punctured wound, especially if there be any reason to suspect the existence of a communication with the vein, the old operation may be performed; as there will be no reason to deem the arterial coats unsound, and the vessel lies favorably for the purpose. A tourniquet having been applied, the cavity is to be laid open, the fluid and coagulable blood sponged out, and the orifice being detected, two ligatures must be tied, one above and the other below the injured part. But if the case is of some standing, it will be safer to perform the ordinary operation. I did so lately with perfect success.

The disease not unfrequently appears at the groin, being seated in the common femoral artery above its bifurcation—and then constitutes a tumor, which fills more or less completely the triangular hollow that naturally exists at this part of the thigh, and is apt to be mistaken for a chronic abscess.

The only effectual remedy is ligature of the external iliac; and Mr. Abernethy had the merit of executing this bold attempt for the first time, having previously tied the artery in another case on account of hemorrhage. Both the patients who were the subjects of these operations died; but his next case was more fortunate. Mr. Freer, of Birmingham, much about the same time, but rather earlier, met with complete success. Since then, the ligature of the external iliac has been practiced so frequently and successfully that it is now regarded as an ordinary proceeding.

The operation consists in making an opening through the abdominal parietes above Poupart's ligament, pushing aside the peritoneum, and then tying the artery which is thus brought into view, or at all events within reach of the aneurism-needle. The incision for this purpose ought to run nearly parallel with Poupart's ligament, but slightly diverging from it in proceeding upward, so as to be about the distance

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* Guthrie, Medico-Chirurg. Trans., Vol. vii.

of an inch from the superior spinous process. It should be between three and four inches long, and placed lower down or farther up, according to the situation of the tumor, so as to let the ligature be applied at some distance from the sac. Generally speaking, the lower end of the incision ought to be about half an inch above the middle of Poupart's ligament. The surgeon may cut through the integuments and tendon of the external oblique, as it is usually called, without any ceremony; but in dividing the internal, oblique, and transverse muscles, he should use the precaution of raising their fibers with the forceps before cutting them; and having thus exposed a portion of the *facia transversalis*, he may readily dilate the opening to what farther extent seems necessary, by means of a probe-pointed curved bistoury, guarded with his fore-finger. Gently scratching through this facia, which, near the crest of the ilium, does not adhere intimately to the peritoneum, he will be able to push that membrane inward, and introduce his finger down to the artery which runs along the inner side of the *psoas magnus*, loosely connected with the vein. If the aneurism-needle is assisted by the counter-pressure of a finger placed opposite its point, hardly any dissection will be required for detaching the vessel, and if the convexity of the instrument is turned toward the peritoneum, the risk of wounding it or the vein will be diminished; but in this particular the surgeon must be guided by his own convenience. If any considerable branch of the *circumflexa ilii* is cut during the operation, it ought to be secured. The edges of the wound should be stitched together, and lightly dressed. In tying this and other deep-seated arteries, much assistance is obtained from the use of iron or flexible copper spatulas an inch or two broad, and eight or ten long. Sir A. Cooper recommended another mode of operating, which was certainly, in some respects, easier, but objectionable on several grounds, particularly in so far as it exposed the vessel too low down, in the neighborhood of the disease, the lymphatic glands, and the origins of the epigastric and circumflex arteries. This method was to make a curved incision, having its convexity downward, and nearly in the direction of Poupart's ligament, beginning over the margin of the external inguinal aperture, and terminating near the spinous process, then to cut through the tendon of the external oblique muscle, so as to expose the spermatic cord, which being pushed upward, along with the muscles lying over it and the peritoneum under it, afforded room for applying the ligature.

The internal iliac has, on one or two rare occasions, been tied on account of aneurisms of the glutæal and ischiatic arteries, affecting these vessels after issuing from the sacro-ischiatic notch. The operation is to be performed in the same way as that for the ligature of the external iliac, the incision being merely carried farther upward, and

made somewhat longer. The external iliac will form a good guide to the internal, which separates from the other at the sacro-iliac synchondrosis. The ureter crosses the vessel at this part, and might, through want of caution, be included in the ligature.

The common iliac can require to be tied only on account of wounds or aneurisms, extending up the external iliac. Wounds of the common iliac, from balls or thrusts of sharp-pointed weapons, granting that they were not attended with any other fatal injury, would very seldom afford the time and opportunity necessary for applying a ligature, owing to their profuse hemorrhage; and where the aneurismal sac extends up into the pelvis, it generally adheres so intimately to the peritoneum as must render the ligature of the common iliac, without injuring this membrane, all but impossible. Dr. Mott, of New York, has nevertheless lately succeeded in tying the vessel successfully. The aneurism reached far into the pelvis, but he managed to separate the peritoneum from its sac, so as to expose the artery, and pass a ligature round it. He made an incision about six inches long, extending higher up than the one requisite for trying the internal iliac artery, and found great assistance from thin wooden spatulas, which were employed to hold aside the peritoneum with the intestines. Dr. Crampton, of Dublin, in a case which unfortunately did not prove successful, found the operation greatly facilitated by giving the incision a curved direction, with its extremity toward the crest of the ilium, and its upper extremity carried over the point of the lowest false rib. In a case of very large iliac aneurism, extending nearly to the umbilicus, I tied the common trunk without so much difficulty as might have been expected; but mortification had commenced previously, and amputation of the limb subsequently did not save the patient.

The aorta is occasionally found, on dissection of dead bodies, to be very narrow, or altogether impervious, either in consequence of original malformation, or owing to the complete spontaneous coagulation of large aneurisms in its course. In these cases the blood seems to be conveyed to the parts below the obstruction, chiefly by means of the anastomoses between the lumbar arteries and those of the intestines. If, therefore, the aorta could be tied without the infliction of a mortal wound, there is reason to believe that a cure might thus be accomplished in aneurisms ascending too high for being remedied by ligature of the iliac. In dogs and other animals, having long and thin loins, it is not difficult to tie the artery, by making a longitudinal incision between the lumbar and abdominal muscles, and turning aside the peritoneum. In the human subject, there is not room enough for proceeding in this way, and the only practicable method seems to be that first adopted by Sir A. Cooper, as a forlorn hope, in a case where the patient was reduced to the very point of death by hemorrhage from

an iliac aneurism. He cut through the parietes of the abdomen in the *linea alba*, turned aside the intestines, cut through the peritoneum again, and tied the vessel. This operation may be performed without much difficulty, but it does not seem probable that the complicated dangers, attending the double wound of the peritoneum, the handling of the intestines, and the shock caused to the system by suddenly impeding the circulation of the great arterial trunk, would leave the patient any chance of recovery. Sir A. Cooper's patient lived thirty-eight hours, and the circulation of the sound limb returned. His death was ascribed to its not doing so in the affected one, which was probably owing to the great extent of the aneurism obstructing a long tract of the artery and its branches, and consequently requiring the blood to be transmitted through many successive anastomoses.

LIGATURE OF THE ARTERIES OF THE SUPERIOR EXTREMITY.

Aneurism seldom or never occurs below the axilla, except as a consequence of wounds, and then, of course, has its sac formed entirely by the cellular substance exterior to the vessel. This happens most frequently at the bend of the arm, owing to the lancet being used incautiously, so as either to transfix the median basilic vein, and puncture the humeral artery which lies under it, or to open the radial or ulnar arteries instead of veins, which, when coming off high and running superficially, they very much resemble. When either of these disagreeable accidents unfortunately occurs, strong pressure should be exercised over the wound, a bandage being applied tightly from the fingers upward, to support the arm in bearing it. If one of the smaller arteries is concerned, this treatment will probably prevent the formation of an aneurism, and if the trunk of the humeral itself is wounded, though the chance of its doing so will be much less, there is still room for hope. Even after an aneurism has formed in this situation, the treatment of Guattani, which consists in rest and pressure of the whole limb, sometimes effects the cure, and, therefore, a trial should be made of these means. In case they fail, it then becomes necessary to resort to the ligature, and it ought always to be applied, here as elsewhere, to the vessel actually concerned, and not to the trunk from which it proceeds. In this situation, the old operation for aneurism is preferable to the modern one, because it affords the easiest access to the artery, and in cases of its high division, saves the surgeon from the risk of tying the wrong vessel; because there is no reason to apprehend degeneration of the coats of the artery in the neighborhood of the disease, as the aperture resulted entirely from violence; and also because simple ligature of the artery higher up than the tumor, has in some instances proved unsuccessful, owing to the free anastomosis of the branches distributed about the elbow. The best way of proceeding is

to lay the sac fairly open—to evacuate its contents; and then bringing into view the wound of the artery, either by completely suppressing all flow of blood through means of a tourniquet, or by withdrawing the fore-fingers or thumbs from each other after their points are placed fairly on the orifice, to apply a couple of ligatures—one above and the other below the opening.

Should it ever be thought necessary to tie the humeral above the elbow, the operation may be performed by making an incision, two inches and a half in length, along the inner edge of the biceps muscle. The artery will be found lying on the radial side of the median nerve, which, by its size and firmness, affords a good guide, strictly connected with its *venæ comites*, and covered by the humeral vein.

When the arteries of the fore-arm happen to be wounded, they ought to be tied at the injured part. The radial is found in the first muscular interspace next the radius, and the ulnar in the first muscular interspace next the ulna.

Wounds of the hands and wrist are frequently attended with profuse hemorrhage, for which the humeral artery is sometimes tied. But the fact of this operation checking the bleeding, proves that the case did not require it, since, if the hemorrhagic tendency were strong, it could not be subdued by a ligature so far distant from the wound, and with so many branches intervening. In all these cases, pressure, if properly applied, will be found perfectly sufficient for the purpose.

AXILLARY ANEURISM.

Next to the ham and groin, the axilla is the most common seat of spontaneous external aneurism. It generally begins in the form of a small circumscribed tumor, formed by the external coat of the artery, and after increasing for a time gradually, suddenly enlarges upon rupture of the sac. It then not only fills the axillary cavity, but projects beyond it.

The first attempt to cure the disease in this situation by operation was made by Pelletan, who proposed to divide the clavicular origin of the *pectoralis major*, and thus expose the subclavian artery where it passes out below the clavicle. His colleagues withheld their consent, and would sanction only a dive with the needle after the integuments were divided. This ineffective and dangerous attempt was tried, and of course proved unsuccessful. Mr. Keate afterward succeeded by executing the proposal of Pelletan so far as regarded the division of the pectoral muscle, but he also then plunged his needle in search of the artery. Mr. Chamberlayne operated more scientifically, by dividing the muscle and then dissecting down to the vessel.

The operation is difficult, owing to the depth of parts—the troublesome hemorrhage proceeding from branches of the *thoracica humeraria*

that lie in the way—the subclavian vein overlapping the artery—and the close proximity of the large nerves going to form the axillary plexus, which are apt to impose upon the surgeon, and be mistaken for the artery. It is also seldom admissible, owing to the height to which the disease generally extends upward. The best mode of performing it, is to make an incision along the lower margin of the clavicle, from the coracoid process to near the sternum, and then another about the same length, proceeding downward from the acromial extremity of the former, in the direction of the space between the deltoid and pectoral muscles. The clavicular origin of the latter being then divided, and any arterial branch that bleeds considerably having been tied, the surgeon dissecting down on the acromial side of the plexus of the vessels and nerves, in order to avoid the vein, will find the artery, and be able to include it in the ligature.

The subclavian artery can be much more easily and advantageously tied above the clavicle, immediately after it passes out behind the *scalenus anticus*, where it is more superficial, detached from the vein, and at a greater distance from the disease. Mr. Ramsden had the merit of first performing the operation here, and, though the case terminated unfavorably, it led to others, which have established this as the best proceeding for the cure of axillary aneurism. Dr. Post of New York met with the first instance of success.

The mode of operating described by Mr. Ramsden has hardly been improved. The patient being placed on his back with the head rather lower than the trunk, and his shoulders having been depressed as much as possible, an incision should be made along the upper edge of the clavicle, from the insertion of the sterno-mastoid to that of the trapezius. Another cut, perpendicular to the former, and of about the same length, ought next to be carried from its center upward, parallel with the external edge of the sterno-mastoid. The flaps thus formed should be reflected with the *platysma myoides* and fat—the jugular vein being, if possible, avoided or held aside; and then the surgeon dissecting down to the lower edge of the inferior belly of the *omo-hyoideus*, exposes the *scalenus anticus*, taking care not to cut the supra-scapular artery, which must be tied if wounded. Tracing this muscle to its insertion into the first rib, he is led infallibly to the artery which passes out behind it, immediately above its attachment. He then either carries the needle round the vessel where thus exposed, or, in case of its showing any sign of morbid alteration, uncovers it a little farther by cutting or turning back the edge of the scalenus, in doing which there is no danger of injuring the phrenic nerve, as it lies here quite at the external edge of the muscle, having crossed it obliquely in descending from the cervical plexus. It appears from the cases on record that the large nerves going to constitute the axillary

plexus, though not lying in the way of the artery, are apt from their proximity to be mistaken for it; wherefore the surgeon should be cautious in passing the ligature, and not tie it until he is satisfied, by the effect of compressing what he has included, that it is really the artery.

The subclavian artery may be tied also on the inner or sternal side of the scalenus; but the numerous branches that spring from the artery here, together with the close neighborhood of the pleura, vein, and on the left side the thoracic duct, render this operation extremely difficult and dangerous; while, as already observed, it offers no inducement in regard to increasing the distance between the ligature and aneurism. Dr. Colles, of Dublin, performed this operation unsuccessfully. In a case of immense diffused aneurism extending from the clavicle half way down the chest, in consequence of the axillary artery being ruptured by external violence, I tied the subclavian at the outer edge of the scalenus, but without the effect of preventing hemorrhage from a puncture that had been previously made, under the impression that the swelling was not of an aneurismal nature, and consequently found it necessary to amputate at the shoulder-joint, which proved successful.

Case I.—On the 15th of October last, I received an urgent summons to Inverness, to see a gentleman who had met with a serious injury, and, on my arrival, learned the following particulars of the accident from Drs. Robertson and Nicol, and Mr. Fraser, who was the patient's ordinary attendant. On the 23d of September, the patient, twenty-three years of age, had been thrown out of a gig upon the road with great violence, and lighted on his left shoulder. When taken up, he complained of pain and swelling in the arm-pit, and surgical assistance being immediately procured, it was at first thought that the humerus had been dislocated downward. On more careful examination, it appeared that the bone was in its proper place, and that the hard tumor in the axilla, which had been mistaken for its head, depended on effusion of blood. The patient was kept quiet in bed, with cooling lotions applied to the injured part. For a day or two, the swelling increased, extending down the arm, and the side of the body, and attended with discoloration of the skin. A gradual improvement then took place in the uneasy feelings, as well as the external appearance. But on the tenth day after the accident, a sensation of gushing was felt in the arm-pit, and the pain and tension suddenly became as great as ever. Leeches were applied, and the case again proceeded favorably for eight days, when another gush took place. Attacks of this kind then became more frequent, and at length occurred almost daily. They were always relieved by leeches, of which about three

hundred had been applied. I found the arm enormously swelled by œdematous effusion, which extended to the points of the fingers. A large fluctuating tumor occupied the axilla, and distended the pectoral muscle. There was no pulse at the wrist, and not the slightest movement or sound could be perceived in the swelling. The patient, worn out by pain, loss of blood, want of sleep, low diet, and apprehension, was reduced to a state of extreme weakness.

In these circumstances, it seemed difficult to determine whether there was an axillary aneurism, or merely a bloody effusion. The gushing sensation, and absence of pulse at the wrist, were in favor of the former view, while the complete absence of pulsation and aneurismal *bruit* in the tumor, from its commencement, and during the whole period of its existence, could hardly be accounted for, except by the latter explanation. The case being thus doubtful, and as pressure had not been tried, it did not appear prudent to resort to any operation until the effect of careful bandaging had been ascertained. A flannel roller was accordingly applied from the fingers to the shoulder, and round the chest.

As it was very uncertain what steps might in future be required, and quite impossible for me to assist in their execution at so great a distance from home, the gentlemen above-mentioned proposed that the patient should be conveyed to Edinburgh by the steamboat. This plan was readily acceded to by him, and as the boat sailed the same evening for the last time that season, the preparations for his departure were immediately made. He bore the fatigue of getting on board and leaving the vessel, as well as the voyage itself, which occupied two days and nights, much better than could have been expected, and arrived at the lodgings provided for him here, in all respects better than when he left Inverness. He derived great comfort from the bandage; the swelling of the arm was considerably reduced; and there had been no return of the gushing sensation.

He continued in this satisfactory state for three days, but on the morning of the 24th, sent for me, on account of severe pain in the most prominent part of the swelling. This corresponded with the hollow of the axilla, and formed a round prominent tumor of a dark-red color, apparently about to open. The patient was impressed with the idea that matter had formed, and entreated me to make an opening for its escape. Thinking that a small puncture might be made with safety, I introduced the point of a narrow bistoury, and finding that nothing issued, enlarged the wound to the extent of half an inch, when a small clot of blood was squeezed out. Hoping from this, that there was merely a bloody effusion from the smaller arteries or large veins, I placed a piece of lint loosely upon the wound. Four hours afterward, at eleven A. M., I changed the piece of lint, and a few minutes after-

ward observed it wet with arterial blood, a jet of which immediately followed. By means of a pin thrust through the lips of the wound, and a ligature tied round it, I prevented further hemorrhage for the time, and then considered what was to be done, with Sir George Ballingall, and Mr. Dewar, of Dunfermline, who had happened to call. They concurred with me in thinking that the subclavian should be tied without delay, and this, with their assistance, was accordingly done.

The elevation of the clavicle by the axillary swelling, and the condensation of the cellular substance consequent upon the eccyhmosis, of which the discoloration extended from the neck to the hip, rendered the operation more difficult than usual; and the artery not only lay deep, from being on the left side, but was overlapped by the cervical nerves to a great extent. These obstacles having been overcome, the artery was exposed, and tied with a single silk ligature. The patient passed the remainder of the day tranquilly, and next day, when I saw him in the forenoon, seemed to be going on well. But at two o'clock P. M., two or three ounces of blood escaped from the wound in the axilla, and a compress of lint was then secured over it by means of a spica bandage. At seven next morning, as the bleeding returned to a somewhat larger extent, I stuffed the orifice with lint. At eleven A. M., it was thought right to lay open the cavity, turn out all the clots that could be reached, and apply graduated compresses. When the artery was thus exposed, it bled freely, but not with such force as to resist the pressure of the lint. In half an hour afterward, however, the hemorrhage recurred, and as the temperature of the arm was then distinctly lower than natural, Sir George and I decided that the only remaining resource, was amputation at the shoulder-joint.

Drawing the patient to the edge of his bed, I readily removed the limb, and exposed to view a frightful cavity containing coagulated blood, extending as low down the side as the latissimus dorsi, and stretching forward under the pectoral muscle. The artery appeared to have been torn across, immediately below the origin of the subscapular, through which the blood was flowing in a retrograde course; I tied it with one or two other vessels, scooped out all the clotted blood I could reach, and then stitched the edges of the wound together. The patient, for several hours after the operation, threatened to sink under this final act of his trials. He complained of nausea, and was deadly pale; his face was covered with cold perspiration, and his pulse could hardly be felt. Small quantities of wine were given to him frequently, and in the evening he revived, feeling warm, and comparatively comfortable; the pulse became firm, and could be counted 160. Next day, it was 140; the day following, 120; and so on until it fell to the natural state. In other respects, the improvement was equally progressive, and before the end of a week, there was no room for anxiety,

except on account of the ligature above the clavicle. It was longer of separating than usual, but probably lay loose for some time before it came away, owing to the patient's extreme aversion to let it be touched. His recovery was complete, both in regard to the wound and the general health.

The points in this case, most deserving of attention, are: 1. The way in which the artery was ruptured; 2. The absence of pulsation and aneurismal bruit in the tumor; 3. The inefficacy of tying the arterial trunk at a distance from the rupture, and with the intervention of branches; and 4. The success of amputation in very desperate circumstances. Whether pulsation was prevented by the artery being torn entirely across, and whether ligature of the subclavian would have proved effectual, if not preceded by puncture of the tumor, are questions which I leave to the consideration of the reader.

Case II.—In the beginning of July, Dr. Cunningham, of Glasgow, called upon me, with a gentleman suffering from an axillary aneurism, of which, the following history was given:

The patient, a stout, square-made man, of short stature, fifty years of age, while, as he supposed, in perfectly good health, about a fortnight before, when getting hastily off a carriage, had made a false step, and nearly fallen backward. In the effort to prevent this, and to secure his hat, he was conscious of throwing his left arm upward and backward with great force. No inconvenience was noticed subsequently, until a few days after, when he felt a difficulty in keeping his arm close to the chest, and upon searching for the cause of this, discovered a swelling in the arm-pit, which throbbed or pulsated. He immediately applied to Dr. Cunningham, who, recognizing an axillary aneurism, proposed a consultation.

I found the aneurism so large as to fill the axilla, but quite circumscribed, and distinctly pulsating. The pulse, at the wrist of the affected limb, was rather weaker than in the other arm. The complexion and general aspect of the patient, were such as are usually supposed to denote disease of the heart; the pulse was irregularly intermittent, and the action of the heart was perceived, over a larger extent than could be considered natural. But it was stated, that there had been no alteration for a long while in the appearance of the patient, or in his ability for exertion, which was represented to be that of the most perfect health, and I could not detect any distinct evidence of serious organic alteration in the heart. Drs. Christison and Begbie examined him at my request, and came to the same conclusion. It therefore seemed to me, that although the case could not be considered in any view, as favorable to the success of an operation, it was, nevertheless, not one in which the patient should be refused the chance of

escape thus afforded from the fatal result of his disease, which otherwise appeared all but certain.

He lost no time in coming to Edinburgh for the purpose of submitting to the operation; and, upon doing so, to prepare for it was confined to bed on the antiphlogistic regimen.

On the day of his arrival, I remarked that the pulse throughout the affected arm had become very weak; and on the following day I could not detect it either at the wrist or in the tumor, which, during the few days that had elapsed since I first saw it, had acquired a great increase of size. The prospect of spontaneous coagulation derived from this change, would have made me delay the operation, even if all other circumstances had been favorable to its performance. But the pulse became very quick; the arm swelled to a large size from œdematous effusion; and excessive pain was felt throughout the limb. On the following day, another unpleasant symptom was presented by a diffused blush over the fore-arm, of that peculiar hue which is wont to precede mortification, resulting from the inflammation of parts imperfectly supplied with blood. Small doses of antimonial wine, with the solution of muriate of morphia, were administered internally, to allay the general excitement; and soothing lotions, containing opium, with acetate of lead, were applied to the seat of pain. On the morning of the 13th, the arm, from the elbow downward, suddenly became cold and devoid of sensation. The redness, leaving this part, ascended toward the shoulder, the pulse could hardly be counted, and there was every sign of speedy sinking under the violence of constitutional reaction.

It was, therefore, with no less surprise than satisfaction, that, during several succeeding days, this apparently hopeless condition was observed to assume gradually a more promising character. The arm which, from the time it became cold, had been simply wrapt in flannel, regained its proper temperature; the redness of the skin disappeared; the pain in a great measure subsided; and the patient resumed the state of tranquillity that had existed previously. The swelling of the arm also, which had attained an enormous extent, especially toward the axilla and shoulder, which it raised almost to the patient's ear, and stretched strangely outward from his side, sustained a marked diminution.

In consideration of these encouraging changes, the hope of a spontaneous cure was again entertained, and the pulsation, which could be perceived only by the ear, was ascertained to be confined to an extent so small, that there could be no doubt as to coagulation having taken place throughout a large portion of the cavity. But on the back part of the shoulder, where the skin had been extremely distended, when the swelling was at its height and had not since either regained its

natural consistence, or lost the purple color then assumed, there now began to be presented the appearance of a slough. It was hoped that this might be the effect of pressure limited to the integuments, and separation of the dead part was anxiously watched, with a view to ascertain whether it was confined to the surface, or extended to the cavity. In the course of a short time, the worst fears were verified by a gradual enlargement of the aperture, exposing to view a mass of coagulum and sloughy muscular substance, through which arterial blood began to ooze, and stain the patient's shirt.

Upon the 6th of August, I requested Dr. Duncan, together with Dr. Cornwall, who had taken the ordinary management of the case, to consider what could be done to prevent the obviously impending hemorrhage, which threatened to prove speedily and almost instantly fatal. Ligature of the artery was quite out of the question, as the arm, though its temperature was restored, had not regained either sensation or voluntary motion, and, independently of all other objections to this operation, under existing circumstances, would certainly have been deprived by it of the scanty vital power still remaining. I therefore proposed amputation at the shoulder-joint, which met with approval, and, as there was no objection on the part of the patient, proceeded without delay to this formidable undertaking.

The patient having been brought to the edge of his bed, I made an incision from the acromion downward and backward through the sloughy aperture, and from the same point, another downward and forward over the joint, so as to unite their terminations at the lower part of the axilla, and form nearly two equal flaps, which, being held aside, allowed the disarticulation to be readily completed. As pressure could not be effected upon the vessel above the clavicle, in consequence of its elevation by the tumor, a fearful gush of blood issued from the cavity of the aneurism when laid open, but was instantly arrested by Dr. Duncan, who placed his thumb upon the part from which he felt the jet proceed, and retained it there, until, by the application of the eight or ten ligatures, I prevented hemorrhage from the smaller vessels. Upon examining the state of the axillary artery, we found no distinct orifice, but merely a funnel-shaped expansion where it communicated with the aneurism. I, therefore, made an incision from the upper extremity of the wound quite to the clavicle, in the direction of the vessel, cut through the tendon of the pectoralis minor, and by careful dissection of the condensed textures in which it lay imbedded, exposed a sufficient portion of the artery for safely applying a ligature. This having been done, the edges of the wound were brought together, and retained by stitches, with the assistance of compresses and a bandage.

The patient bore the operation well, made no particular complaint

after it, and steadily advanced toward the recovery, although the separation of sloughs was not completed until the end of a fortnight. But while this process was gradually accomplished, the cavity rapidly contracted, so that when the whole of the dead parts were cast off, it was nearly closed. The ligature came away on the 15th of September, and the patient then returned to Glasgow, where he was soon afterward able to resume the duties of a public situation, which he holds in that city.

Having already placed upon record two instances of life being preserved, under very peculiar circumstances of axillary aneurism, by amputation at the shoulder-joint, I have now the more pleasing duty of relating a case of the same disease, remedied by ligature of the artery without removal of the limb.

Case III.—A gentleman, thirty-four years of age, from the north of Scotland, recommended by Dr. Ross, of Tain, applied to me on the 25th of July, on account of an axillary aneurism of the right side. It was of a large size, filling the axilla, and pressing forward the pectoral muscle, so as to be distinctly perceptible through the clothes. The patient stated, that about sixteen years ago he had fallen down a stair, and, in an involuntary effort to save himself, had seized the railing with his right hand, and consequently sustained a very severe wrench of the limb. With exception of some pain, and the ordinary uneasiness attending such an injury, he had not afterward suffered any noticeable inconvenience further than an occasional difference of temperature in the hands, until about ten months ago, when he began to suffer from pain in the little and ring fingers, which gradually became almost constant and extremely distressing. More lately, the axillary tumor had attracted attention. On the 29th, with the assistance of Drs. Duncan and Mackenzie, I tied the subclavian artery, where it emerges from the scalenus anticus, by a single silk ligature, drawn with all the tightness in my power. No inconvenience whatever was experienced—the ligature separated on the fifteenth day, and the patient at the end of another fortnight, returned home, perfectly free from pain, and with hardly any perceptible remnant of the tumor.

In performing the operation I made an incision along the clavicle, so as to extend over the edges of the sterno-mastoid and trapezius muscles, and another from the center of this upward, parallel with the edge of the latter muscle. The dissection was conducted entirely by the knife and forceps. The needle was passed under the artery, with its convexity upward, and the ligature was tied by the unaided effort of the fingers. It has been advised to pass the needle with its convexity downward, or toward the clavicle, with a view to protect

the vein from injury. But this vessel is not at all in the way, while the cervical nerves are so situated in regard to the artery, as in general to render it nearly, if not quite, impossible to convey the ligature from below upward. It has also been advised to employ the assistance of some mechanical contrivance for tightening the knot. But I feel persuaded that the thread will always be within reach of the fingers, and may be more safely tied by them simply, than with the intervention of any instrument.

CAROTID ANEURISM.

The carotid artery at the angle of the jaw, where it divides into the two great branches, occasionally becomes the seat of aneurism, which is easily recognized by the general characters. Sir A. Cooper first ventured to tie the common carotid for this disease, and though the attempt did not succeed, he repeated it most successfully not long afterward. Since then, the artery has been secured very frequently, on various accounts, and with so little difficulty or bad consequences, that the operation is regarded one of ordinary interest.

The patient should be placed on his back with the head low; or, at all events, on a level with the trunk. The external incision should be two inches and a half long, or more, if the patient is fat. It should extend along the internal or sternal edge of the sterno-mastoid, and be more or less distant from the sternum, according to the part of the vessel which it is wished to tie. The artery lies most superficially in the higher part of the neck, where it is covered merely by the integuments, *platysma myoides*, and fascia. Lower down, it is overlapped by the sterno-mastoid, and sterno-thyroid muscles; and is crossed by the omo-hyoid. The upper part of its course, therefore, would be preferable for the purpose; but as the disease or injury which requires the ligature, is generally seated here, the surgeon has seldom any choice, and must operate at or below the crossing of the omo-hyoid. The edge of the sterno-mastoid having been brought into view, should be held aside, so as to expose the ascending belly of the omo-hyoid, which, in its turn, being turned either up or down, according as it is desired to tie the vessel above or below it, of which plans, the latter is usually preferable, the sheath of the vessel will present itself. It ought to be opened on the tracheal side, to avoid the *descendens noni*, which runs down the center, and, what is of much more consequence, to prevent any risk of injuring the internal jugular vein, which lies on the outer side, and overlaps the artery. The *par vagum* being situated behind the vessels, is hardly in the way of harm. The convexity of the needle ought to be turned toward the vein.

The bold operation of tying the *arteria innominata* was first performed by Dr. Mott, on account of subclavian aneurism. The liga-

ture separated on the fourteenth day, and everything seemed to be going on favorably, when a week afterward bleeding commenced from the wound, and recurred from time to time, until the patient's strength was completely exhausted, which happened on the twenty-sixth, after the operation. Graefe tied the artery, with a similar result. The ligature separated, and the patient seemed to be safe, but died at the end of two months, from hemorrhage. It thus appears, that when a ligature is applied so very near the heart, the danger of bleeding continues longer than in other situations, owing probably to the great force of the blood which issues directly from the heart tending to break through the weak and recently formed obstruction. Perhaps the danger might be diminished by weakening the action of the patient's system by depletion, for some time after the ligature is detached.

[Of the excellence of this suggestion, there can be no question. But the means by which this retardation and weakening is to be effected, is another thing. To reduce the quantity of the circulating medium by bleeding, is not to be thought of by the surgeon who is really anxious to induce recovery in the shortest possible time. It is a well-known fact, that quality may compensate a loss of quantity in blood. Hence, in such cases, the patient should be put on what might be termed a dry diet, by which is meant, such as will not manufacture a large quantity of blood. Diaphoretics should be freely employed, until the more watery portions of the blood have been reduced. Then the patient should have small doses of gelsemin and hydrastin, along with small doses of phosphate of iron; or, if preferred, the gelsemin (the active principle of gelseminum sempervirens), may be given along with tonic doses of sulphate of quinine.—R. S. N.]

The operation, though important and dangerous, is not very difficult. Two incisions should be made of nearly equal length, which may be about two inches, one upward from the sternum, along the inner edge of the sterno-mastoid, and the other transversely, from the same point across the sternal attachment of this muscle. The flap of skin thus formed being reflected, the sternal attachments of the sterno-mastoid, sterno-hyoid, and sterno-thyroid muscles, must be divided to a sufficient extent for bringing into view the sheath of the vessels, which ought to be opened, as if for the ligature of the carotid. This vessel having been exposed, if traced down, will lead to the innominata, round which the needle should be passed very carefully, with its convexity turned toward the sternum, in order to avoid the pleura and great venous trunk.

In aneurisms at the root of the neck, not admitting of the ligature being applied between them and the heart, Mr. Wardrop has lately recommended the practice suggested by Brasdor, of tying one or more

of the vessels proceeding from the sac, so as to cause stagnation of its contents.* The proposal is reasonable, and Mr. Wardrop has recorded two cases, in which the patients are said to have been relieved from carotid and subclavian aneurism, by tying the vessels respectively; and one of aneurism of the innominata, in which Mr. Evans operated successfully, by obstructing the carotid. The general observations which have been made above, on this subject, render it unnecessary to say anything farther in regard to it here.

The temporal artery, from its exposed situation, and also the operations to which it is subjected for the abstraction of blood, occasionally proves troublesome in practice. I have met with a small circumscribed aneurism of it, originating from external violence, without the infliction of a wound. In this case, the best mode of procedure is to make an incision through the skin, and dissect or pull out the sac completely, so as to leave merely the orifices of the vessel, which may then be tied as usual. Hemorrhage from wounds, whether intentionally or accidentally inflicted, may in general be suppressed by carefully employed pressure—a piece of cork wrapped in lint, being applied over the part, and secured firmly in its place by a narrow roller, carried round the head and crossed repeatedly over the compress; but if the bleeding has not been effectually restrained at first, it becomes more obstinate from its continuance, by distending the cellular substance, and impeding the effect of external pressure. In these circumstances, there should be no hesitation in cutting through the seat of the injury in the direction of the vessel, separating the integuments a little on each side, and then passing a ligature under the artery by means of a sharp needle, first on one and then on the other side of the breach.

Case I.—Thomas Blair, aged forty-three, farm-servant, was admitted on the 10th day of February. He stated, that, seven weeks before this time, he had been struck down by a horse, behind which he was standing, and was found by his friends lying insensible. It appeared that the shoe had cut his face over the malar projection, and that the point of it, which was very large and thick, had inflicted a blow on the throat a little below the angle of the jaw on the right side. He soon recovered his consciousness, and complained of great pain throughout the injured side of his head and neck, which was much swelled. In the course of ten days the swelling of his face subsided, but that of the neck rather increased and became more painful; and, as his sufferings seemed constantly becoming more severe, he had been sent to be under my care in the hospital.

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* Wardrop on the Cure of Aneurism, by a New Operation.

The hollow at the upper part of the neck was occupied by a tense swelling, which was felt to be distended in every part at each pulsation of the heart. The patient kept his head bent forward to the right side, and seemed very apprehensive of any alteration in this position. He complained of intense pain in the right side of the head. The right eye appeared nearly a half smaller than the other, and the whole of the face on the same side had an immovable sort of appearance, as if paralysed. The tongue was protruded with difficulty, and, when withdrawn, was evidently moved by the action of the left half alone, the other being quite passive, and merely following the contracted part; but both sides received the impression of taste. The voice was almost entirely lost, and replaced by a rough croaking whisper. From these circumstances, it was concluded that an aneurism of the common carotid artery had resulted from the blow, and caused pressure on the nerves at the root of the neck.

The common carotid was tied on the 18th. The operation was difficult, from the thickness of the patient's neck, the distension caused by the aneurism, and the unfavorable posture in which the head was maintained. The *omo-hyoideus* having been exposed, and pulled a little downward, the sheath of the vessels was opened on its tracheal side by lifting up a fold with the forceps, and cutting it with the knife. The artery being thus rendered quite bare for a small extent, without any other disturbance to its position or connections, a strong silk thread was passed round it by the simple curved needle, and tied as tightly as possible. *The patient was instantly relieved from the pain, and never had any return of it.* Not the slightest unpleasant symptom followed the operation. The swelling ceased to pulsate, and gradually diminished; the countenance acquired a more natural expression; the different parts which had been paralysed regained their mobility; and, lastly, the voice returned. The ligature came away on the 11th of March. The patient's strength having been very much reduced, was slowly regained; but he went home on the 14th of April, and is now well.

This case seems interesting from the mode of its origin, the symptoms attending it, and also the circumstance of its being the first instance of carotid aneurism operated on in Edinburgh.

Case II.—In the early part of last April, I was requested by Sir William Newbigging to meet him and Dr. Abercrombie in consultation, on the case of a lady about sixty years of age. She was rather tall and very thin, with the general appearance of feebleness. Her complaint was a tumor of the throat, in the situation of abscesses connected with the tonsil. It was first noticed in the month of November preceding, after more than usual suffering from a dry hard cough,

which had existed with little interruption for five or six years. The swelling, at first very small, gradually increased, and at length occupied the fauces so as to interfere with deglutition, and occasion uneasy feelings of distension by its bulk, which fully equaled that of a large walnut. It was not circumscribed in appearance, presenting, indeed, the diffused aspect of a purulent collection; but when examined by the finger, was felt more distinctly limited than an abscess of the part. At the same time, its contents were found to fluctuate throughout their whole extent, and a strong uniformly distending pulsation could be perceived over every accessible part of the tumor.

There could be no doubt as to the nature of the case, and as little in regard to its result, if effectual means were not taken to arrest the progress of the disease. It was plain that an aneurism had been formed in the course of the internal carotid artery, between its origin from the common trunk and entrance into the cranium. And it was no less obvious, considering the progressive enlargement, together with the continued excitement from coughing, that the swelling, if permitted to increase, must soon encroach on the pharynx, so as to impede deglutition altogether, or cause suffocation, unless the sac should ulcerate, and terminate the patient's sufferings by hemorrhage at an earlier period. We therefore decided on recommending that the common carotid should be tied; and meeting with no objection on the part of the lady or her friends, agreed to perform the operation on the following day.

In presence of the gentlemen above mentioned, together with Drs. Patrick Newbigging and Mackenzie, I cut down upon the vessel, and tied it with a single silk ligature, just below the crossing of the *omo-hyoideus;* no difficulty whatever was experienced in effecting this, hardly a teaspoonful of blood escaped, and the patient walked to an adjoining bedroom without appearing to suffer or to have suffered almost any disturbance. During the day she complained of pain in the back of her neck near the occipital region, and struck me as looking even more pale than she had done previously; the pulsation of the tumor still continued, but was much less forcible. In the evening a draught containing the solution of muriate of morphia was prescribed, to be taken in the event of restlessness, but which, not proving requisite, was withheld.

Next morning, about six o'clock, I was informed that the patient had all at once been seized with nearly incessant vomiting and discharge from the bowels. On visiting her, I found all the signs of approaching dissolution, the weakness being extreme, the features bloodless, sunk, and altered in expression, and the pulse small, feeble, and irregular. The evacuation of greenish watery fluid, both upward and downward, still continued, though not so frequent as at first. Not-

withstanding the use of stimulants, no improvement took place, and she expired about six o'clock in the evening, thirty hours after the operation.

The parts concerned were examined in presence of the gentlemen who had witnessed the operation, with the exception of Dr. Abercrombie, who was otherwise engaged, and with the addition of Mr. Goodsir, who assisted me on the occasion, and afterward dissected the preparation. The artery was found to be tied just as could have been desired, without any disturbance of the vein, nerves, or neighboring textures. It was traced upward to the bifurcation, immediately beyond which the internal carotid dilated into an aneurismal sac. We then opened the head to ascertain if the disease extended within the cranium, but discovered nothing in the state of the vessels at all abnormal. The lower jaw was next divided, so as to afford free access to the tumor, which, being exposed up to the base of the skull, allowed us to see that the artery, before entering the carotid canal, regained its usual characters. I cut it across there, and detached the whole extent of the vessel down to the root of the neck.

It appeared, upon careful examination, that a crevice, nearly half an inch in length, had been formed through the inner coats, in the upper or anterior surface of the internal carotid, about midway between its origin from the common trunk and entrance into the cranium; that the external coat had expanded so as to form the sac of the aneurism, and that the pressure caused by the tumor, had distorted the course of the vessel, and given it a sigmoid direction. The contents of the sac were coagulated, except in a narrow channel corresponding with the current through the artery, which, it may hence be inferred, had not been completely arrested. Indeed, this was not and could not reasonably be expected, when the free retrograde passage afforded by the anastomosing communications of the external carotid was taken into account.

The result of this case was not less unexpected than distressing. I had repeatedly tied the carotid, and never met with the slightest bad consequence from the operation. The patient, though thin and fragile-looking, seemed free from any organic disease beside the aneurism, and possessed, in a remarkable degree, that composed disposition of mind which is so favorable to recovery from injuries. The artery was tied with more than usual facility, and with the most perfect insulation that could be desired. Though doubts might be entertained as to the cure of the disease, through want of sufficient obstruction to the flow of blood, no apprehension was entertained of danger from the operation, and I feel quite unable to offer any satisfactory explanation of its fatal issue.

In a pathological view, the case is interesting, from presenting an

example of aneurism in a very unusual situation. The branches of the carotid artery within the cranium occasionally open into aneurismal sacs, which are apt, by their bursting, to cause sudden death from hemorrhage. But a well-ascertained aneurism of the internal carotid artery, exterior to the cranium, does not seem to have been hitherto recorded.

Case III.—Though this case was not treated in the hospital, it deserves to be related from the unusual circumstances with which it was attended. I am indebted to Mr. Cheyne, of Leith, for the following history of it:

"William Mason, a delicate boy, nine years of age, complained, in the latter end of August, of a soreness in the left *fauces*. This ceased in two days. About a week afterward — viz: on the 29th August—he was seized with pain and swelling of the right *fauces* and smart accompanying fever. The fever left him in a day or two, but there remained a painful external swelling, situated between the upper part of the larynx and the mastoid muscle. This increased gradually, extending upward to the jaw, and finally to the tube of the external ear.

"On the night of the 8th September, a discharge of pus took place from the *meatus externus* of the ear, and it continued till the following evening. A teacupful probably was the quantity altogether discharged. The latter portions were tinged with blood. Soon after the discharge of pus had ceased, the ear having been lightly bound up, the boy raised an alarm in consequence of a flow of blood from the ear. Upon removing the bandage, it continued profuse for a short time. It then ceased. Some ounces appeared to have been lost. A compress and bandage were applied. The swelling dependent on the abscess had disappeared entirely.

"*September* 13.—A fresh bleeding from the ear. Sponge introduced, with compress and bandage over it. Since the 9th (the date of the first bleeding), a swelling has been formed between the angle of the jaw, mastoid process, and external tube of the ear; it has no pulsation.

"*September* 16.—The swelling considerably increased; it now extends downward, bordering on the *larynx*. On examining the mouth, a swelling is perceived like that produced by an enlarged tonsil pushing forward the anterior curtain of the palate, and insinuating itself between the jaw and the lining membrane of the mouth: it is rather pale in color, soft, and elastic. The following symptoms are present: considerable difficulty of breathing and swallowing, imperfect articulation, frequent hawking of phlegm from the throat, difficulty of closing the jaws, difficulty of lying down, very uneasy expression of the counte-

nance, with constant watering of the eyes. The pulse of the temporal artery to be distinctly felt.

"*September* 18.—In the evening he discharged suddenly from the mouth two or three ounces of florid blood. For a day or two before this, the phlegm from his throat had been tinged with blood. The case appearing to be one of extreme hazard, and the object of present apprehension, hemorrhage, likely to be fatal, either by its quantity or through the vicinity of the *trachea* by causing suffocation, it was suggested by Dr. Combe to tie the common carotid artery, and this operation was proposed to the parents. They, however, did not accede to it at that time. It was then agreed to request Mr. Syme's opinion on that case. Mr. S. having approved of the measure, it was again recommended (by him) to the parents, who now consented to it. The artery was then tied at the side of the larynx by Mr. Syme.

"*October* 1.—Immediately after the operation an improvement in all respects took place, and has been gradually increasing till to-day. The operation itself gave rise to no inconvenience which would not have resulted from a simple wound of the parts. The external swelling decreased quickly, and is now gone. There still remains a slight internal swelling in the situation of the tonsil. No pulsation of the temporal artery. Since the first bleeding at the ear, there has always been an oozing from it of a thin bloody ichor.

"On the evening of this day, while he was reading aloud, a profuse bleeding took place from the internal *fauces*, and at the same time from the ear. It soon ceased. About ten ounces were discharged in all. On examining the mouth some clotted blood was seen adhering to the right tonsil. He had been allowed incautiously to go out of doors in the forenoon, and had run about without restraint.

"*October* 2.—A tumor equal in size to the half of a hen's egg has been formed since last evening between the angle of the jaw, mastoid process, and tube of the ear. There is no increase of the swelling in the mouth.

"*October* 6.—The external swelling decreased in some degree. There has been no discharge of the ichorous fluid from the ear since the first instant.

"In the evening a fresh discharge of blood from the internal *fauces* and nostrils (from one source, however, the right side of the *fauces* as it appeared). It soon ceased, but not before about twenty ounces were lost. Immediately after he had syncope. In two hours he had rallied, and was asleep with a pulse at 120.

"*October* 18.—In the evening, a bleeding from the *fauces* to the amount of eighteen ounces, followed by faintness and very small pulse.

"After the eighth there was no return of bleeding, the swelling

decreased, and he gradually recovered. For some time the right tonsil appeared of a dark color.

"He is now as well as before the commencement of his illness."

As this case, together with others of hemorrhage under similar circumstances, has been referred to in support of the opinion, that an abscess may be converted into an aneurism, by ulceration of a contiguous arterial trunk, I think it right to remark, that although arteries frequently open on the surfaces of sinuses and ulcerated cavities, the only instance of communication with an abscess on record, is the one supposed to have occurred in University College Hospital. In a practical point of view, the question is of little consequence, since the aneurism, resulting from conversion of an abscess, would require the same diagnosis and treatment as if it had possessed an aneurismal constitution from the beginning.

INTERNAL ANEURISMS.

When aneurisms are seated so as not to be within reach of surgical operation, they belong to the province of the physician. The only remedy they admit of is the treatment of Valsalva, and in conducting it there are three circumstances of essential importance; 1. That the treatment should not be commenced until the sac has attained a considerable size, so as to favor the desired coagulation; 2. That the patient must be reduced to the utmost degree of weakness, compatible with recovery; and, 3. That this must be accomplished, not by a small bleeding every third or fourth day, which would probably produce excessive reaction, a state most unfavorable for attaining the object in view, but by frequently-repeated depletion during the first few days, after which the strictest abstinence must be enjoined, to maintain and increase the effect thus obtained.

[This may be accomplished by means of the alcoholic-bath just as well, and with less danger to the patient.—R. S. N.]

ANEURISM BY ANASTOMOSIS.

Mr. John Bell described, under the title of Aneurism by Anastomosis, a subcutaneous tumor, which possessed a flattened shape, a doughy consistence, and a cellular structure, communicating very freely with the branches of neighboring arteries, so that it pulsated or throbbed obscurely, and bled most profusely when opened by incision, though when the morbid structure was cut entirely out there was not any more hemorrhage than might have been expected from the vessels of the part. Mr. Bell regarded this formation as composed of cells with which the veins and arteries freely communicated, and into which the blood was induced to flow with extraordinary force. The tendency of aneurism by anastomosis being to enlarge, open, and bleed, Mr. Bell

recommended complete and speedy excision as the only and essential remedy for it.

More recent and extended observation has not only thrown light upon the nature of this tumor, but also proved that there are others of an analagous kind which should be arranged along with it; and the term of Morbid Erectile Tissue has been employed as the general title for denoting them. Every part of the capillary system probably has the power of inducing blood to enter it, and those portions of the body which, being distinguished by a remarkable degree of this property, are said to be formed by erectile tissue, as the penis, nipple, or wattles of the turkey-cock, in all probability exercise a similar power in a similar manner, but only on a greater scale, proportioned to the development of their structure. Instead, therefore, of regarding them as constituted by distinct cells interposed between the veins and arteries, it seems more reasonable to suppose that they consist merely of a dilatation, as it were of the capillary vessels. In some animals the natural erectile tissue is evidently formed in this way, as for instance, the glans penis of the ram and fallow deer, of which this is a representation, and there are a few cases recorded in which the morbid erectile tissue was no less distinctly composed of dilated and convoluted vessels.*

Fig. 11.



Under the head of Morbid Erectile Tissue may be ranged, 1. Aneurism by anastomosis; 2. Nævus, or longing mark; 3. The subcutaneous nævus, as it has been called and well described by Mr. Wardrop; † 4. Also excrescences of the mucous membrane at the verge of the anus, which possess the structure and bleeding disposition of the erectile tissue. The first three of these are, with hardly any exception, congenital. The last one is never congenital, and seldom occurs before middle age.

Aneurism by anastomosis is always seated in the cellular texture lying under the skin, which is more or less elevated, and in general slightly discolored, having a blue or purple shade observable in it. The swelling throbs synchronously with the heart, becomes smaller when compressed, and more turgid when the circulation through the arteries is excited or that through the veins impeded. At birth it is usually small, frequently hardly perceptible, and sometimes does not enlarge until puberty. After becoming active it generally in-

* Pelletan, Clinique Chirurgicale, T. ii, p. 59.—MacLachlan, Glasgow Med. Journal, No. 2.—Wardrop, Lancet, No. 211.—Author, Ed. Med. and Surg. Journal, No. 98.

† Med. Chirurg. Trans. Vol. ix, p. 200.

creases in size, at length opens, and bleeds from time to time, in the female observing the menstrual periods in its tendency to do so. Its most common situations are the head, hands, and feet. The best remedy for this disease is excision; and in performing the operation it is proper to cut quickly and completely beyond the morbid structure. The ligature also may be employed, care being taken to embrace the whole extent of the disease—since a troublesome or even fatal hemorrhage may otherwise result. The arteries leading to the diseased part becoming much enlarged and tortuous, have repeatedly suggested the trial of attempting to afford relief by tying them, but in no case with success. Ligature of the arterial trunks, as the carotid in aneurism by anastomosis of the face or scalp, has also, for the most part, proved unavailing, though in some instances the result proved more satisfactory. Messrs. Travers and Dalrymple, tied the carotid with success in two cases of swelling in the orbit, which seemed to be of this nature;* but, as these cases were not of congenital origin, they must be regarded as questionable exceptions to the general rule.

[The operation has been attended with more success in America, and even in England. Erichsen succeeded in five of six cases. My own operations have been quite as successful. I am clearly convinced that both carotids should be ligatured at intervals of three or five weeks. In every case where the double operation has been performed the patient ultimately recovered.—R. S. N.]

Nævus is an enlargement of the venous capillaries, apparently confined to the surface of the cutis. There is little swelling, but very obvious discoloration, generally of a dark or purple hue. There is no pulsation, but turgescence when the circulation is disturbed, especially by any circumstances which obstruct the passage of the veins. The disease is most frequent in the head and trunk, but also appears on the extremities. It is always congenital; and when first observed is usually of very small extent, being merely a point or speck, which increases rapidly after birth. After attaining a certain size it generally either remains stationary, disappears by absorption, or ulcerates and scabs away by degrees.

The treatment ought to vary according to circumstances. If the nævus is stationary, and not inconvenient, it ought not to be meddled with. If increasing, or so situated as to occasion deformity, it ought to be cut out or removed by ligature; two or more threads being passed under its base, as will be more particularly explained immediately, and tied tightly so as to effect complete strangulation. The application of pressure and astringent washes, and also local irritation, such as that produced by vaccination, in order to cause absorption, or the ulcerating

* Med. Chirurg. Vols. ii and vi.

and the scabbing process, are not only very uncertain and ineffectual, but apt to leave unseemly marks hardly less objectionable than that for the removal of which they are employed.

The subcutaneous nævus is a disease similar to the one last mentioned, but more deeply seated. It exists either alone, or more generally along with the superficial nævus; like which it seems to depend more upon the veins than the arteries. It occurs in the same parts of the body, and is always congenital. At the time of birth, it occasionally has attained a large size, and soon afterward begins to bleed profusely. But much more frequently it increases slowly from a very small commencement, and may not prove troublesome until a pretty advanced period of life. It is recognized by its bulk and extension under the skin, together with the negative character of wanting pulsation. Like the superficial nævus, it occasionally shrinks or ulcerates away.

When this tumor is seated on the face, is rapidly increasing, or threatens to bleed, it ought to be removed without delay, and though excision may, in some cases, be practiced with advantage, as when the base is small, so that the wound required admits of healing by the first intention, in general, or rather nearly always, the ligature affords the most eligible means of removal. If the disease can be completely embraced in two ligatures, nothing more is necessary than to pass a needle, carrying a double thread, from one side of the base to the other, and then tie the two halves as tightly as possible. It frequently happens, from the extent or form of the nævus, that four ligatures are required, and then two needles should be employed; one being passed through the base, but not carried farther, until the other conveys its thread fairly through, by which means any risk of cutting the ligatures by the sharp edge of the second needle is avoided. In this case, the tying of the thread; though facilitated by the morbid surface being divided into smaller portions for inclusion, is rendered complicated and troublesome by their numbers, as well as the circumstance, that any two cannot be rendered secure until they are tied on both sides, whence it is necessary that, while one of the knots is made, the other ends of the threads must be either held or tied at the same time by an assistant. The ligature should be tied in what is called the surgeon's knot; that is, by having the ends crossed twice, which prevents slipping until the fastening is made good. If still more ligatures are required, they must be introduced and secured on the same principle. Thus, in a case of large pendulous nævus, occupying nearly the whole of one side of the face, I employed upward of twenty. On such occasions, the best way of proceeding, is to pass successive portions of a long thread again and again, by means of a needle with an eye in its point, and fixed in a handle.

Mr. Liston has recommended, that in applying ligatures for the removal of erectile tumors, the integuments covering them should be divided by a crucial incision, and reflected so as to let the diseased structure alone be removed, in order to hasten the process, and save the sound skin; a modification of the operation very deserving of adoption in cases admitting of its application.

In a case of this disease in an infant, where the tumor was large and bleeding, Mr. Wardrop, in order to save the life of the patient from immediate danger, tied the carotid artery, and with success. He was induced to follow this course by the unfortunate result of an attempt to cut out the nævus in a similar case, where the child died during the operation.* It would probably be safer practice, in such circumstances, to apply ligatures.

The vascular excrescences which are met with on the inner side of the verge of the anus, hold a middle place between aneurism by anastomosis and nævus. They bleed, or even throw out a jet of arterial blood when injured; but their hemorrhagic disposition is not nearly so strong as that of the former of these diseases. Their situation precludes excision with safety; and the ligature ought always to be chosen as the means for removing them. From one case that has come under my notice, I am inclined to think that a third sort of erectile tumors may be formed by enlargement of the lymphatic capillaries. The tumor had the external characters of a nævus, with the exception of being perfectly *white*. It possessed the usual cellular-looking structure of the erectile texture; but, upon opening spontaneously, instead of bleeding, discharged large quantities of a fluid-like water, containing an admixture of milk. It was cut away with scissors from the inner surface of the labium, from which it grew in a pendulous form. The patient continued perfectly well for four days, and then had a violent rigor, with great constitutional disturbance, which proved fatal at the end of thirty-six hours. The veins were found quite sound; but the lymphatics could be traced up the lumbar region on the affected side greatly distended, and surrounded with the purulent effusion into the cellular substance.

OSSEOUS ANEURISM.

There are various detached cases on record of tumors occurring in bones, and presenting several of the characters of aneurism. In 1826, M. Breshet published an essay on this disease;† and in the same year, without any knowledge of his views, I introduced the title of Osseous Aneurism into the Syllabus of my Lectures on Surgery.

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* Wardrop, Med. Chirurg. Trans., Vol. ix, page 203.

† Repertoire, d'Anatomie, T. ii, page 142.

The tumor in question has been met with, out of all proportion, most frequently in the tibia, at its upper extremity. It has been observed also in the femur and scapula, and the wrist and ankle. The predisposition to it seems strongest in the male sex, and at the time of life between puberty and middle age. The enlargement is attended with severe pain from the commencement. It is at first equally firm and resisting with the other parts of the bone, but, on increasing, becomes more soft and yielding, not over the whole surface, but at some points of its extent, where an obscure pulsation or throbbing can generally be perceived. If other parts of the sac be subjected to pressure, they often give way with a crackling sort of sensation. As the disease increases, the limb affected becomes weak and œdematous, the superficial veins over the swelling are greatly enlarged, and the pain is extremely distressing. At last the sac gives way, and the profuse hemorrhage which ensues, renders immediate amputation necessary. When the tumor is then examined, it is found to contain fluid and coagulated blood, to be hollowed out of the bone concerned, and to have for its cyst the periosteum, more or less strengthened with a lining crust of bone, not dense and compact, but possessing a honeycomb structure, the laminæ of which are directed toward the center of the cavity. If the arteries of the limb be injected, it is found that their trunks are entire; but that their branches, which enter the substance of the bone, communicate so freely with the cavity of the swelling, that the matter used for injection, however coarse, readily flows into it.

The precise nature and origin of this disease have not yet been satisfactorily ascertained. The only effectual remedy for it is amputation. There is one case recorded, where ligature of the femoral artery proved sufficient to cure an aneurismal tumor of the tibia;* but this must be regarded merely as an exception to the general rule. In amputating, it is always desirable to remove the whole of the bone in which the disease originated; since, though part of it may be apparently sound at the time, it tends to renew the morbid action.

[The numerous cases of Osseous Aneurism which we see reported, are much oftener medullary cancer of the bones than true Osseous Aneurism. Quite a number are on record, referred to different bones and variously described; but in every case we can detect all the conditions of Osseo-Medullary Cancer.—R. S. N.]

INFLAMMATION OF VEINS.

The veins are more numerous and capacious than the arteries, whence the blood moves through them more slowly and less forcibly.

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* Lallemand, p. 138.

The veins not only communicate by capillary anastomosis of their neighboring branches, but are frequently united in their course; and hence occasion less inconvenience by their obstruction than that of the arteries does. When the principal trunk of a limb is concerned, the resistance which is opposed to the return of the blood causes more or less œdema. The coats of the veins resemble those of the arteries, but are thinner, more closely connected, and tougher, so that a ligature merely draws them together without cutting the internal ones.

The veins are prone to inflammation, which is very much disposed to spread, and chiefly in the course of the circulation. The vein affected feels hard and painful, especially when extended. The surface of the skin which covers it is often red, from the adjacent tissues taking on the same action. The pain is of a peculiar, oppressive, sickening kind, similar to what attends inflammation of the glands and absorbents. When these local symptoms are at all acute, they are accompanied with more or less fever, which is distinguished by what is called the typhoid type or character, indicative of extreme irritation, whence it is also usually named Irritative Fever. The pulse is quick and small; the respiration hurried and anxious; the countenance dark, contracted, and expressive of much distress; the tongue dry and brown. There is great prostration of strength, and often, especially in the progress of the disorder, delirium. Acute inflammation of the veins, and more especially those of large size, almost always proves fatal. Death may ensue in a very few days, but seldom before the end of a week. On dissection the vein is found thickened in its coats, and containing coagulated blood, or pus, or a mixture of both. There are also very generally purulent effusions, in the cavities of the chest, those of the joints, or in the subcutaneous cellular texture, together with deposits in the substance of the lungs, very similar in appearance to tubercles. The explanation of these effects has not yet been well made out, but, on the whole, their cause seems most probably to be the violence of the constitutional disturbance; though the opinion most generally received at present is, that the pus suffers absorption into the mass of circulating fluid, and thus produces the effects in question. In proportion as the inflammation is chronic, the danger is small. The local effects are, in the first instance, redness and thickening of the vessel, then suppuration into the cavity, or the effusion of lymph, which, together with coagulation of the blood, just as happens in the arteries in similar circumstances, impedes the circulation, and obliterates the channels affected. The veins are induced to take on the adhesive action by compression, and the other kinds of irritation which occasion it in the arteries, but they are much

more readily excited by these means to inflame. The atheromatous and calcareous degenerations occur so rarely in their coats, that they may almost be said never to affect them.

The causes which have most effect, and are most frequently concerned in the production of inflammation in the veins, may be referred to three heads:

1. The application of a ligature.
2. Immoderate or long-continued distension.
3. The infliction of wounds which do not heal by the first intention.

John Hunter, who had the merit of directing attention to the causes and important consequences of venous inflammation, when they were almost entirely overlooked,* observed that the veins running near parts which had suffered inflammation and suppuration took on a similar action, and effused pus or lymph, or both, into their cavities. Succeeding inquiry has ascertained that this is not a constant, or even very common occurrence; and it is possible that he may have sometimes mistaken the effect for the cause, the abscesses in the cases he observed, being perhaps the consequence of venous inflammation, and not the origin of it. Of all the causes which induce inflammation of veins, there is none more certain than the application of a ligature. It was formerly the custom, to tie them without any ceremony; and there is every reason to believe, that many of the fatal results of operations, which used to be attributed to some obscure cause, such as peculiarity of constitution, or unwholesomeness of the atmosphere, really proceeded from this source. The danger from ligatures applied to veins, was particularly insisted upon by Mr. Travers.† Generally speaking, the danger of tying veins, is in direct proportion to their magnitude; but death has happened from the ligature or wounds of the saphena below the knee. Immoderate or long-continued distension, seems to be the cause of that inflammation of the iliac veins, which is occasionally observed in women who have suffered a severe or protracted accouchement. And if, as appears very probable, or rather positively proved, the complaint called *phlegmatia dolens*, which consists in a painful œdema of the inferior extremity, depends on obstruction of the iliac veins, in consequence of inflammation,‡ this cause of its production must be regarded as one of frequent operation. The inflammation, it is true, may be attributed to irritation, propagated from the venous orifices on the inner surface of the uterus; but, if proceeding from this source, would probably prove more obstinate and

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* Transactions of the Society for the Improvement of Medical and Chirurgical Knowledge, Vol. i, p. 16.

† Cooper and Travers' Surgical Essays, Vol. i, 227.

‡ Davis, 1828. Med. Chir. Trans., Vol. xii, p. 419.

fatal than it is wont to do on such occasions. When the wound of a vein does not heal by the first intention, it must, of course, inflame; and the morbid action thus instituted, is apt to follow its characteristic tendency to spread. John Hunter showed that many of the bad consequences of venesection, which used to be referred to pricks of the nerves or tendons, really depended on the wound not healing, and the veins inflaming.* It is of great consequence to notice, that the tendency to venous inflammation, varies with the state of the system; so that while very slight causes may prove sufficient to induce it, very severe ones may fail in doing so. Thus in crowded hospitals or other unhealthy situations, a large proportion of operations terminate fatally from inflammation of the veins; and wherever erysipelas abounds, phlebitis is apt to be associated with it.

With regard to the treatment, it must be admitted, that when the inflammation is acute, and attended with much constitutional disturbance, it hardly yields to any remedy. In such cases, therefore, the prognosis should be very unfavorable. General bleeding seems to do no good; and, on the contrary, rather to increase the irritability of the system, which more requires calomel and opium. Local bleeding and fomentations are useful, when the inflammation is acute. Warm solutions of acetate of lead with opium, and the *tinctura saponis cum opio* with camphorated mercurial ointment, and the pressure of a flannel bandage, constitute the best local applications when the affection is chronic.

[Professor Syme seems to have tried his hand at inconsistency, in this paragraph. It will be borne in mind by the reader, that inflammation of the veins is attended with *irritative* fever; and he says, "General bleeding seems to do no good; and, on the contrary, rather to increase the irritability of the system." It is plain, therefore, that irritants should be avoided. Bleeding renders the system more susceptible to irritants, therefore he will not bleed; yet, he will give calomel, an acknowledged irritant. But it may be said, he modifies its action by the opium. It is plain that he recognizes calomel to be an irritant, and also that *irritation* must be avoided. Hence, to blunt the sensibilities, and escape the effects of the mercury, he gives opium. There is no reason in this course. The opium itself is an irritant, if given in small doses; it would be better to give larger doses of morphia. The proper treatment, is the administration of diaphoretics, fomentations, sedatives, and perfect quiet. The gelsemin and phytolacin act charmingly in such cases.—R. S. N.]

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* Op. et loc. cit.

WOUNDS OF VEINS.

When veins are cut across, their orifices are closed by the same process which effects the obstruction of arteries in similar circumstances; and the smaller moving force of their contents favors this occurrence on one side of the aperture, while the valves still more effectually prevent any disturbance of the adhesive process at the other. If the vein concerned, is one of the great trunks, and devoid of valves for preventing a retrograde motion of the blood, pressure ought to be preferred to ligature for restraining its hemorrhage, and a very slight resistance will be found sufficient. When veins are not divided, but merely wounded through a part of their circumference, they do not necessarily or usually either remain open or suffer complete obstruction, as the arteries do, but heal, and regain their original condition. This difference is owing to the smaller distension of the venous coats, which allows the effusion of lymph that takes place from their cut edges, to become organized. If the lips of the wound continue *in situ*, they unite at once with each other; but if they are displaced, owing to their transverse direction, or any other cause, there is, in the first instance, injection of blood into the surrounding cellular substance; then the formation of a firm, round, smooth coagulum, exterior to the wound; and, *lastly*, an exudation of lymph from the vessels of the vein, which, resting upon this clot, extends from one cut edge to the other, and gradually unites them together, after which, the clot being absorbed, the cure is completed.

VARIX.

Varix consists in a dilatation and thickening of the veins, which become at the same time elongated, and thus constitute a tortuous swelling. It occasions deformity, weakness of the part concerned, by impeding the circulation, and uneasy sensations from the same cause. It also renders the vein liable to chronic inflammation, ulceration, and hemorrhage. The saphena, spermatic, and hemorrhoidal veins are most liable to the disease. It seldom appears in the limbs before maturity, but occurs in the other situations which have been mentioned at a much more early age. Tall stature, and largeness of the veins, predispose to the disease; constipation, pregnancy, hepatic derangement, and sedentery occupations, favor its actual commencement.

The treatment of varix consists in obviating the exciting causes, for which purpose the bowels ought to be kept open, the testicle ought to be suspended, and the leg ought to be supported with a bandage or laced stocking. The horizontal posture ought to be preferred, and the erect one avoided. When the vein inflames, it ought to be treated according to the rules already explained; the symptoms are almost

always subacute or chronic, and local remedies merely are required. When it bleeds, pressure must be applied. When ulceration occurs in connection with it, which most frequently happens in the case of varix of the saphena, and affects the inner side of the leg a little above the ankle, the surgeon should be guided in his practice, by the indications of indolent or irritated action which the ulcer may exhibit. If there appears not to be any obstacle to the cure on either of these accounts, he may simply use the black-wash and a bandage, under which cicatrization is in general speedily accomplished.

In order to effect a radical cure of varix, it has been proposed to obliterate the vessel above the diseased part, so as to take off the dilating effects of a superincumbent column of blood, and this has been done in various ways. The ligature, which had been long before tried and rejected on account of the danger attending its use, was recommended by Sir Everard Home, and on his authority tried rather extensively, but with such troublesome and even fatal consequences, as effectually prevented it from being employed in future. Mr. Brodie revived a still older method, viz: obliterating the vein by incision. Instead of cutting out the varicose portion, which was the ancient practice, he merely divided the vessel, using a narrow knife, and making a small puncture of the skin. The consequences of this practice though not so disastrous as those of the ligature, were still occasionally disagreeable enough to overbalance the chance of benefit. Another proposal was made by Mr. Mayo, viz: to make an eschar with caustic over the vein at a sound part of its course above the varix, and thus excite such inflammation of the vessel as might be sufficient to occasion obliteration of its cavity by the effusion of lymph. This method has the recommendation of being an imitation of a natural process of cure, for it sometimes happens that the varicose vessel, in consequence of spontaneous inflammation, becomes completely impervious. In exciting this action artificially, however, there is great difficulty in avoiding the opposite extremes of deficient and excessive irritation, and alarming inflammation has in consequence been repeatedly induced. M. Velpeau has more lately introduced a method of great simplicity, and perfect safety, which consists in passing a common pin through the skin, under the vein, while it is compressed and pushed outward by a finger and thumb, and then tying a thread tightly round it. A little redness and swelling follow, and ulceration soon succeeding detaches the pin with hardly any pain, and no danger. It is still questionable, however, whether obstruction of the vein merely at a part of its course is adequate to afford permanent relief; and in the present state of information upon the subject, it seems that the most judicious course in treating varix is to be satisfied with remedy-

ing its bad consequences, and using means for preventing their occurrence.

ANEURISMAL VARIX.

When a contiguous artery and vein are wounded together, it occasionally happens that the orifices of the vessels remaining undisturbed, the blood is allowed to pass from the artery into the vein; the consequence of which is, that the latter vessel becomes large and tortuous, communicating a jarring sort of sensation to the hand which examines it, and a peculiar thrilling sound, like the purring of a cat, or the prolonged articulation of the letter R (bruit de râpe), is heard when the ear is brought near the injured part. The limb becomes œdematous and cold, owing to the want of its usual supply of nutritious fluid, the greater part of which, instead of proceeding onward to its destination, flows back to the heart, and also to the obstacle opposed to the return of the blood from the veins below, by the distension of those above, which is caused by the forcible current of the artery. From the same cause there is hardly any pulsation of the artery below the part where it is wounded, while it pulsates above more forcibly than it did before.

Dr. Hunter first described this disease,* but Dr. Cleghorn, of Dublin, suggested the name which is used to denote it.† It is most apt to occur at the bend of the arm, where the median basilic vein lies over the humeral artery, but may do so in any part of the body where a large artery and vein are contiguous. Instances of it have been observed in the femoral, popliteal, carotid, and subclavian vessels, from wounds.

Aneurismal varix is generally more inconvenient than dangerous, the veins, after they become fully distended, usually remaining without any farther change. It is, therefore, seldom necessary to do more than apply a bandage to the limb, with a compress over the injured part. Should the swelling, pain, or other symptoms of the case ever be so severe as to warrant an operation, a radical one may be performed by tying the wounded artery both above and below the opening.

VARICOSE ANEURISM.

When, in the case of a vein and artery communicating, the blood issues from the latter vessel into the cellular substance, so as to constitute a false aneurism, and at the same time continues to gain access to the vein, a combination of aneurism and aneurismal varix results, which has been named Varicose Aneurism. A good idea of this curious complication of derangement will be obtained from this representa-

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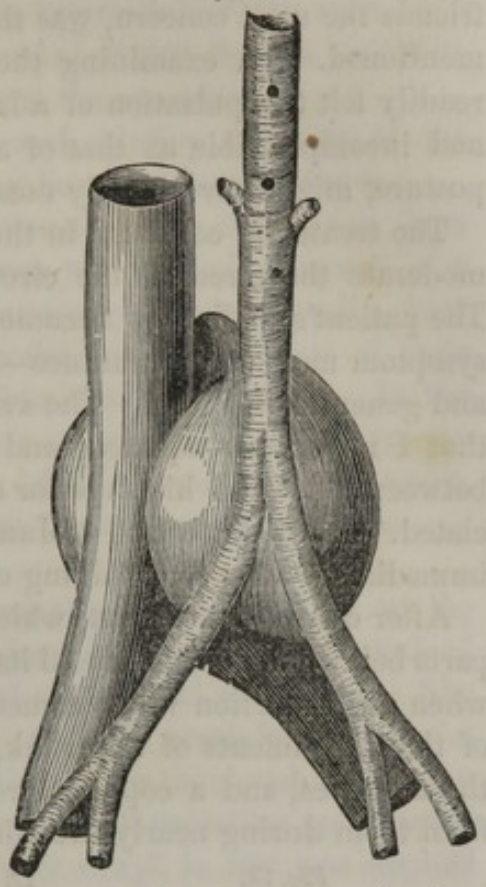
* Med. Obs. and Inquiries, Vol. i, p. 340.

† Ibid. Vol. iii, p. 110.

tion of the disease, affecting the aorta and *vena cava*. It originated spontaneously, and was the first instance of this kind ever recorded,* though others have been noticed since I published the case. With few exceptions, the bend of the arm has been the seat of this occurrence, in consequence of the median basalic vein being transfixed, and the artery wounded. Owing to the free passage which remains for the blood, and the absence of regurgitation or stagnation, their is little or no tendency to coagulation; and in operating here I have found the interior of the sac perfectly white and smooth, like the inner surface of an artery. No benefit, consequently, would be derived from the simple ligature of the humeral; and the proper course is to lay open the cavity, and apply two ligatures to the vessel, one above and the other below the aperture.

Fig. 12.



Varicose Aneurism, or a sac containing blood, and communicating with the trunks of both an artery and vein, is a rare occurrence; and the only instances which have hitherto been recorded, either of it, or the analogous condition of aneurismal varix, where the blood passes at once from the trunk of an artery into that of a vein, originated from wounds. The femoral, popliteal, and subclavian vessels, and more frequently those at the bend of the arm, have been thus affected, in consequence of having their contiguous coats divided by some sharp-pointed weapon; but no instance has hitherto been observed of the opening taking place spontaneously, and I, therefore, think it right to relate the following case of varicose aneurism, which affected the aorta and vena cava, and occurred without any external violence.

Case I.—Robert Scott, aged twenty-two, in the beginning of October, began to complain of pain in his back and limbs, throbbing in the epigastric region, and an incessant whizzing noise, which seemed to proceed from the same part. His suffering became so severe in three or four weeks, that he found it necessary to confine himself to bed, and then came under the care of Dr. Robertson, who soon afterward

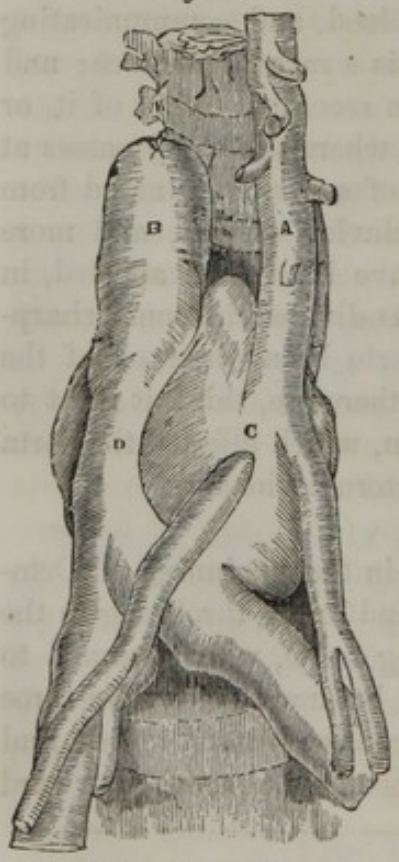
* Ed. Med. and Surg. Journal, Vol. xxxvi, p. 104.

requested me to see him. He complained greatly of pain in his back, and coldness of his feet; but what seemed to occasion him and his friends the most concern, was the constant noise that has been already mentioned. On examining the abdomen while he lay on his back, I readily felt the pulsation of a large tumor; but it was not so strong and incompressible as that of an ordinary aneurism, and in the erect posture, might have readily escaped observation.

The treatment consisted in the use of all those means which tend to moderate the force of the circulation, but proved quite unavailing. The patient's sufferings became progressively aggravated, and a new symptom made its appearance—viz: œdema of the inferior extremities and generative organs. The swelling of these parts attained a degree that I never saw equaled, and occasioned an extraordinary contrast between them and his superior extremities, which were thin and emaciated. In the latter end of January, the patient died rather suddenly, immediately after complaining of a pain at his heart.

After death, the œdema, which had previously been confined to the parts below the pubis, diffused itself over the whole of the body; so that, when the dissection was commenced by the usual longitudinal incision of the integuments of the trunk, they were found to be distended fully three inches, and a copious stream of serous fluid continued to issue from them during nearly the whole of the subsequent examination.

Fig. 13.



In order to expose the disease completely, I removed the thoracic and abdominal viscera, and then traced the aorta from its commencement downward. Having found an aneurismal tumor (c) seated at the bifurcation of the artery (A), which adhered intimately to the vena cava and vertebræ, I dissected out the iliac vessels, cut them across some inches beyond their division, and then sawed away the bodies of the lumbar vertebræ, together with the promontory of the sacrum.

On examining more particularly the preparation thus detached, we observed that the tumor was of a flattened oval figure, about the size of a large orange; that it adhered to, and had caused absorption to some depth of the bodies of the lowest three lumbar vertebræ; and that it was intimately connected with the vena cava (B), which appeared much flattened, distended, and thickened. It was now suggested that there might be a commu-

nication between the aneurism and vein, and on making a small opening into the sac, so as to evacuate its contents, we found this actually to be the case. Immediately above the bifurcation of the vena cava (D), there was a round aperture, somewhat larger than a sixpence, which afforded a free entrance into it from the aneurism.

The engraving represents the form and relative situation of the aneurism, and the preparation itself may be seen in my museum.

This case seems to possess some interest, in the first place, from being, so far as I know, the first instance to be found on record of a varicose aneurism being formed spontaneously; and, secondly, from affording an opportunity of ascertaining the actual condition of parts concerned, instead of studying them from imaginary plans. In the following case, I had another opportunity of examining this very rare form of disease, as existing in the living body in consequence of injury, and found a perfect resemblance between the two aneurismal sacs.

Case II.—Agnes Easton, aged twenty-three, was admitted on the 28th of May last, on account of an injury which she had sustained about three months before, in being bled at the bend of the arm. She stated that, the blood having spouted out with great force, and of a bright color, a bandage was firmly applied at the time, and that, when this was removed on the following day, a small pulsating point could be felt at the seat of puncture. A penny wrapt in lint was applied here, and allowed to remain for a month, when a tumor, the size of a pigeon's egg, was found to have been formed. The arm, then and afterward, was cold and weak.

On examination, it appeared that, through the medium of the aneurism, a communication still existed between the artery and vein, the latter of these vessels being considerably distended, and conveying a jarring sensation to the hand placed over it, while the characteristic purring sound was distinctly heard, by applying the ear either directly or with the intervention of the stethescope.

A tourniquet having been screwed on, the sac was laid open freely, so as to avoid the vein. Instead of the laminated coagulum which lines the interior of aneurisms presenting itself, it was then seen that the cavity contained only fluid blood, and that the surface of its parietes was perfectly smooth, white, and, in short, similar to that of an artery. There was hence some difficulty in detecting the wounded part of the vessel; and I found it necessary, partly by dissection, but chiefly by tearing, to remove the principal part of the sac. The orifice being then discovered, I exposed the artery above and below it, so as to pass a ligature at each of these points. No inconvenience was experienced, pulsation being felt at the wrist the evening after the operation, and the patient was dismissed quite well on the 16th June.

It is plain that the communication with the vein remaining open, had established a thoroughfare, if I may use the expression, through the sac, so as to prevent the stagnation requisite for allowing blood to coagulate. And it is no less evident that, in this case, ligature of the artery, without opening the cavity, could not have produced any beneficial effect.

The following case may be added as an example of the common form in which brachial aneurism used to be met with, when venesection was more frequently practiced than at present.

BRACHIAL ANEURISM.

William Smith, aged twenty-three, was admitted on the 19th of October last, on account of a pulsating tumor at the bend of the arm, which had resulted from his being bled there nine weeks before. In consequence of the pressure that had been used to remedy the aneurism, the skin covering it was ulcerated to a small extent; the pulse at the wrist was nearly as strong as in the sound limb.

On the following day I laid open the sac, having previously applied a tourniquet, turned out the clots, and readily discovering the wound of the artery, passed the needle first above and then below it, so as to convey a couple of ligatures, which were tightly tied. No bad symptoms followed, and the patient was dismissed on the 13th of November quite well.

This case, in addition to the others that I have on former occasions recorded, illustrates the safety and efficiency of the old operation, when applied to aneurisms resulting from injury of the humeral artery. In one instance, related ten years ago, I simply tied the artery above the swelling, but afterward found it necessary to lay open the cavity, and place a ligature on each side of the orifice in the vessel. Since that time I have always at once resorted to the latter measure, and found it no less effectual than easy in execution.

CHAPTER X.

EXTERNAL INJURIES.

BRUISES.

By a Bruise, is understood an injury caused by a blow, or by violent compression, without division of the integuments. Its effects vary according to circumstances, but the most common one is ecchymosis, or the injection of blood into the cellular tissue, which occasions more or less swelling, and discoloration of the skin. The blood after being thus effused, is gradually removed by absorption, during which the color of the part passes through various shades of red, green, and yellow, that have been differently explained, but not as yet satisfactorily. To promote this absorption, some gently stimulating lotion, containing the salts of ammonia, spirits and vinegar, ought to be applied, together with moderate pressure. It is usual to apply leeches in the treatment of ecchymosis, but it is clear that, the blood being not contained within its own vessels, and, on the contrary, extravasated into the cellular substance, bleeding from the surface cannot possibly be of any service, and may even do harm by increasing the weakness which the skin has previously suffered, both from the immediate effect of the injury, and also by its separation from the parts beneath which attends the bloody effusion, and thus causing sloughing.

The blood is sometimes effused in larger quantity, and collected in a cavity formed by the torn and distended cellular substance. In this kind of bruise, there is usually the same sort of discoloration of the skin as in the former, but the size and fluctuation of the tumor readily distinguish it. This condition is comprehended under the title of ecchymosis; but it is necessary to make a distinction between the two, though doubtless merely different degrees of the same injury, since the process of recovery is apt to be considerably different.

It is always desirable to promote absorption, and for this purpose, the same means as those employed to discuss superficial ecchymosis are proper, especially discutient lotions and pressure. Sometimes the clot, greatly contracted and indurated, remains after the serum has been removed, without suffering any farther change. At other times, the serum continues little or not at all diminished, in which case blisters, succeeded by pressure, ought to be used, and if these means fail, the fluid may be drawn off by a trocar. The contents of these

effusions are also apt to shift from one part of the body to another, according to the tendency of their weight.

When the effusion is large, or the parts about it have been much injured, or the patient is of an irritable habit, the parietes of the cavity are apt to inflame and convert it into an abscess. Any tendency to this ought to be allayed or prevented by cold applications; but, so soon as there is reason to believe that matter has actually been formed, vent should be afforded to it and the remaining blood by a free incision; after which, pressure and some stimulating wash will promote contraction and closure of the cavity.

The appearance of ecchymosis so regularly attends the infliction of bruises, that much importance is frequently attached to its presence or absence in medico-legal investigations. The discoloration of the skin caused by it, must be distinguished from the *livor*, which generally appears on the dependent parts of the body after life becomes extinct. This may be readily done by making an incision through the part in question, as the blood in ecchymosis will be found coagulated in the seat of its effusion, while in livor, there is merely congestion of the cutis. The time required for ecchymosis showing itself, is also an important point. The more superficial the effusion is, the more quickly will the discoloration appear—and according to the difference in this respect, three or four hours, or as many days, may be necessary. It should be recollected, that the effusion and discoloration are two distinct things; that the former happens immediately after the injury, and may be certainly discovered by dissection; but that the latter, though, when present, affording evidence of violence having been sustained, does not prove by its absence, that no effusion has taken place. Persons laboring under the disease named *Purpura hemorrhagica*, have often discolored marks on the skin, resembling those of ecchymosis. Blood may be effused into the cellular texture, in consequence of violence sustained soon *after* death—but in this case, it proceeds from rupture of the larger vessels, and is not coagulated. Finally, it is necessary to notice, that the presence of a wound in a bruised part, may prevent any discoloration by allowing the blood to escape.

WOUNDS.

By Wounds are understood solutions of continuity, in the surface of the body effected by violence. They are divided according to the injury which the parts concerned sustain in addition to the wound, and also the form which it possesses, into Incised, Punctured, and Contused.

INCISED WOUNDS.

In incised wounds, there is merely a solution of continuity inflicted by a cutting instrument, without any other injury of the part concerned,

and the superficial extent of the aperture bears a large proportion to its depth. The great object in treating such wounds is to induce union by the first intention, and the general observations, which have already been made on that process, suggest the practice to be followed with this view. All foreign matters should be removed from between the cut surfaces; blood and serum should be prevented from collecting, by avoiding early and close dressing; and the actions of the part should be kept within proper bounds by suitable local and general means—more particularly cold applications and low diet, with perfect quiet of the part affected. Wherever pressure is sufficient to keep the cut edges in contact, it ought to be preferred for the purpose. Plasters are apt to approximate the lips of the wound merely, and so far from pressing the deeper parts of the wound together, rather render them more seperable by relaxing the superjacent integuments. Stitches introduced at the distance of about an inch from each other generally answer better; but, if the edges of the wound require to be kept in very nice contact, they must be introduced more closely, or the twisted suture, as it is called, may be employed. This consists of needles or pins passed through the edges of the wound, at the distance of from one to three-quarters of an inch, according to circumstances, being inserted most closely where the parts concerned are thinnest. A silk thread, such as that employed for stitches or ligatures, is then twisted round each needle in succession in the figure of 8, so as to draw the cut surfaces together. The needles may be withdrawn on the third day, but the recent union ought not to be subjected to any strain for some time afterward. This kind of suture was formerly much practiced, but is now almost confined to the treatment of wounds of the lips and cheeks, and even here may be abandoned with advantage in favor of the simple stitch. When the wound opens into a cavity, as the mouth, a joint, or the abdomen, inconvenience might result from delaying its closure until the bleeding ceases, and in such circumstances, no harm can ensue from its continuing after the edges are brought together, since the blood will pass into the cavity. In treating all incised wounds, it is proper to enjoin perfect quiet and the strict antiphlogistic regimen; also to keep the wound constantly covered with cold wet cloths, unless the parts should be defective in action from weakness, when spirituous applications may perhaps be useful.

PUNCTURED WOUNDS.

When the superficial extent of a wound is very small in proportion to its depth, it is said to be *punctured;* such wounds are caused by instruments which have small points and generally blunt edges. They are not formidable in their appearance, but usually turn out much more troublesome than incisions of far greater size, being apt to

occasion extensive inflammation, and widely diffused suppuration. These bad consequences of punctures are usually ascribed to their penetrating some fascia, which inflames and gives rise to the effects in question; and there can be no doubt that they are generally most productive of bad consequences when they do penetrate such a structure. But it seems reasonable to refer the diffused inflammation occasioned by them, in some measure at least, to the confinement of the discharge which necessarily results from their narrow aperture, and the effect of the fibrous expansions which have been injured, in keeping up irritation by their pressure.

The most effectual method of checking the inflammation, which proceeds from punctures, consists in dilating the orifice of the wound, and it is, therefore, often recommended to do this immediately after their infliction, to prevent bad consequences. It does not appear however, that the chance of these is thus diminished, and, therefore, the most prudent course is, in the first instance, merely to apply cold water or other lotions proper for moderating action and preventing inflammation. Should it actually commence, dilatation ought to be performed without delay, and then fomentations with poultices are proper for a few days, or until the suppurative action is fully established, when compression and stimulating washes must be substituted in their stead.

CONTUSED WOUNDS

Are solutions of continuity, in which the surfaces are injured by the violence that occasions them; the agent being usually some blunt surface; moving, or on which the body is impelled, with great force. Contused wounds in general bleed less than incised ones; their surface is ragged or lacerated; and sometimes of a dark color, owing to effusion of blood into the cellular substance. When the contusion is considerable, it renders the wound incapable of uniting by the first intention, and excites inflammation, which either terminates in mortification, or leads to suppuration, according to the extent of the injury, and the irritability of the patient. It was formerly the custom to cut away the contused and lacerated edges, to supersede the more tedious process of sloughing; but nature is now allowed to determine what portion is incapable of recovering. All foreign matters ought to be carefully removed from the wound, and its edges should then be placed as nearly as possible in contact. If there is no great degree of contusion, stitches may be employed for this purpose; but, generally speaking, it is better to abstain from them; and if they are used, any appearance of inflammation should be the signal for their removal. Cold applications are proper in the first instance, and ought to be continued until the wound either unites or inflames. In the latter case, warm fomentations and poultices are required; but they must be laid aside

as soon at the sloughs have separated and the granulating action is established. If continued longer than this, they induce great relaxation of the parts concerned, already weakened by the injury, render the granulations large and flabby, and prevent the sores from contracting. The ulcer always tends from its own nature to weakness of action, and therefore, instead of these enfeebling applications, requires stimulating washes, with pressure.

GUN-SHOT WOUNDS

Are solutions of continuity effected through the agency of substances impelled by firearms. They are generally punctured as to their form, and always contused as to their surface. They are consequently apt to occasion extensive inflammation, and sloughing of the parts more immediately concerned. The orifice by which a ball enters is small, round, depressed, and livid; that by which it escapes larger, more elongated, and rather everted at its edges. These appearances vary with the velocity of the ball, the entrance being most, and the exit least distinctly characterized when it is greatest, and *vice versa*. The wound, when first received, occasions a numb sort of sensation, but before long becomes acutely painful. It bleeds less than an incised wound in the same situation would do. When of any considerable extent, it invariably causes, immediately on its infliction, an extreme degree of mental alarm, despondency, and prostration of strength. This constitutional effect is proportioned to the importance of the injury, the weakness of the patient, and his apprehension of danger.

The bad consequences of gun-shot wounds were formerly ascribed to the poisonous agency of the gunpowder; and upon this belief was founded the cruel practice of scarifying or excising the wounded surfaces, and dressing them with scalding oils. Paré introduced a milder practice, which he was led to, in the first instance, by necessity, and was afterward confirmed in by experience and reasoning on the subject. He used merely unctuous applications, and with such success, that his example was soon generally followed. The treatment of gun-shot wounds, though so far improved, still continued unnecessarily severe, since the scarification, which was formerly practiced to remove the poison, still remained in use, to prevent tension and inflammation from the fistulous shape of the wound. John Hunter exploded this system of dilatation, as it was called, by showing that it did not prevent the effects in question, and was performed soon enough if delayed until they actually appeared. The best application at first is a pledget of oiled lint, placed on the wound, and covered with cold wet cloths. Should inflammation supervene, free dilatation, including any fascia that has been wounded and lies within reach, fomentations, and poultices, become proper; when the sloughs are detached, pressure,

with the usual lotions, must be carefully employed, as there are apt to be extensive sinuses; and if these have not a sufficiently dependent opening, it ought to be afforded by the knife.

When the ball, or any other foreign matter introduced into the wound, is not carried through, but remains, it ought to be removed, if this can be done without any very serious cutting or searching; for, though it is no doubt true that such extraneous substances often acquire a fibrous cyst, and cause no disagreeable symptoms, they more frequently excite inflammation, which leads to various troublesome consequences, and may do so after lying for a long while without causing disturbance. The finger is the best probe for detecting the ball or other foreign body; and when farther search is requisite to find it, the nature of the tissues concerned ought to be carefully considered, since the direction of its course is much affected by those of dense and unyielding structure, as the bones, fasciæ, and even the skin. The velocity of the ball, and the position of the body when it entered, ought also to be taken into account.

When the injury is so severe as to render amputation necessary, it has been disputed whether the operation ought to be performed immediately, or be delayed until the primary inflammation subsides, and suppuration is established. In reference to this question, the effects of gun-shot wounds may be divided into four stages: 1. Confusion and prostration of strength, commencing immediately after the injury is sustained, and lasting seldom less than one, or more than six hours, unless it terminates in sinking. 2. Return of strength, attended with more composure of mind, and sensation of the injury. This continues until inflammation begins, which is hardly deferred beyond twenty-four hours. 3. Inflammation, ending in death, gangrene, or suppuration, and occupying from one to several days. 4. Suppuration, which continues until the patient recovers, or has his strength completely exhausted, and dies—which may be in a week or two, or not until the end of months. Amputation may be performed with most advantage in the second and fourth of these stages. Different opinions were formerly entertained as to which of them was preferable; but the extensive experience of the military surgeons who were engaged in the Peninsular war, decided the question; and it is now admitted that amputation during the second stage is out of all proportion most successful; to say nothing of the risk which men wounded on the field of battle must run, if permitted to go through the inflammatory stage, while their shattered limbs are subjected to the irritation of rough carriages, and their constitutions injured by the unwholesome air of crowded hospitals. Should the surgeon find that his patient does not rally within the period usually occupied by the first stage, though assisted by the stimulating effect of wine or spirits, he ought to afford

the chance derived from removal of the limb, unless his strength seems at so low an ebb, that it would certainly sink under the shock of an operation; and, on the same principle, when inflammation has been allowed to come on, and proceeds to gangrene, amputation ought to be performed as giving the patient a chance, however small, of escape from otherwise certain death.

Cannon balls not unfrequently occasion contusions without any breach of the surface, varying from the slightest ecchymosis to complete destruction of the subjacent tissues, so that they are reduced to a gelatinous pulp. Sometimes when the contusion is sustained on the trunk, it causes instant death, in consequence of important organs being ruptured or otherwise injured. These effects used to be ascribed to the *wind of the ball*, or the air violently agitated by its motion. They are now more scientifically and satisfactorily referred to the action of the ball itself, which has had its velocity so far spent as to bruise merely without wounding.

EXTREMES OF COLD AND HEAT.

The first effect of cold is to diminish the vital action of the part to which it is applied. This state of depression, when not carried too far or continued too long, is succeeded by more than usual activity, or what is called reaction, especially if heat or any other stimulus co-operates with the natural tendency to excitement. If this alteration be frequently repeated, the part concerned becomes permanently weakened, being slightly swelled, of a purple color, and not so warm as usual. It is then easily affected by cold, becoming pale, contracted, and numb, and reacts with so much violence as to show symptoms of inflammation, becoming red, hot, itchy, and painful; not unfrequently vesicated and ulcerated. A part thus injured by cold is named a Chilblain.

Chilblains are most apt to occur in persons who possess weak powers of circulation, especially young females, and on the same principle take place chiefly at the extremities of the body, viz: the hands and feet. They ought to be guarded against by avoiding sudden and severe alternations of cold with heat. When formed, they should be protected from cold, and supported in their actions by stimulating embrocations, such as camphorated oil, strong spirits, or, what has been particularly recommended by Mr. Wardrop, a mixture of *tinct. sap. c. opio*, with *tinct. lyttæ*, in the proportion of six of the former to one of the latter. The ulcer of chilblains presents the appearance of a smooth superficial excavation, with thick white edges, and a peculiar viscid slimy discharge. It heals most readily under the *unguentum oxydi hydrargyri rubri*.

More intense cold not only weakens, but entirely suspends vital

action. The part becomes pale, insensible, and shriveled, and is said to be *frost-bitten*. The extremities of the body, such as the fingers and toes, the ears and the nose, are most liable to be thus affected, both from their situation and comparatively languid circulation. A frost-bitten part is not dead, and when freed from the influence of the cold, regains its power of action. It is difficult to determine how long the torpor may last without permanently depriving the part of life; but there is reason to suppose that the period is considerable; and it appears from the relation of Sir John Franklin, that an animal may be restored to its usual actions, even after its whole body has been frozen.*

In treating frost-bite, the great object should be to moderate the reaction, since, if it proves excessive, mortification readily occurs, both because the part is weak, and because its irritability being consequently increased, the inflammation is apt to be intense. The best method is to use friction without any external heat, or even to effect it through a cold medium, such as that of snow, in order to promote the return of circulation, and at the same time guard against excitement. If inflammation comes on, the part ought to be soothed with poultices, or anodyne and astringent applications, such as warm solutions of acetate of lead with opium; the tincture of soap and opium, etc. Local bleeding would increase the weakness, and consequently render the diseased action more unmanageable; but general depletion will be proper if the patient is plethoric. Should mortification ensue, the best dressing will be a soft poultice until the sloughs separate. [The reaction can be better controlled by veratrin.—R. S. N.]

BURNS.

When a part is exposed to higher temperatures than usual, its actions are increased. It becomes red, more or less swelled, and hot. If the heat applied is moderate, or of short duration, the symptoms disappear when it is removed; but when it is intense, or longer continued, the redness caused by it is bright and permanent, and there is a painful sensation of burning. The part is then said to be burned, while in the former case it was merely excited. The inflammation thus induced generally terminates in effusion of serum from the surface of the cutis, which detaches the cuticle, and elevates it into blisters. When the heat is still more intense or prolonged, it destroys the life of the part. The cuticle is then detached and thrown into irregular folds or wreaths, exposing the subjacent cutis discolored and dry. When the heat operates through the medium of fluids, its effects are named Scalds. Burns and scalds are always painful—often long in healing, owing to the feeble action of the resulting ulcer, which is

* Franklin's Journey to the North Coast of America, p. 242.

seated in parts that have been more or less injured by the heat—and sometimes fatal by the shock to which they subject the constitution, by the profuse suppuration which they occasion, or by exciting inflammation of some internal parts.

In treating burns, it is necessary to consider whether the injury is so severe as to destroy the vitality of the part affected, or merely sufficient to induce inflammation of it. In the latter case cold applications afford great relief, and if employed immediately after the accident occurs, may prevent the inflammation and vesication altogether. Another mode of treatment which answers extremely well, though it is difficult to say on what principle, consists in enveloping the burned part with cotton. This practice was introduced from America not many years ago, and is now in very general use. It appears that its good effects are most conspicuous when pressure is conjoined with it; and a bandage, therefore, ought to be applied with moderate firmness. When blisters rise, the detached cuticle should be not only laid freely open, but taken away altogether, as its presence seems to increase the irritation. If ulcers remain, lotions of sulphate of zinc, or acetate of lead, are required to stimulate the granulating surface. It was formerly the custom to dress burns with unctuous matters, such as the carron oil, or *linimentum aquæ calcis;* but these filthy and useless applications are now almost entirely superseded by the means which have been mentioned.

When the burn is so severe as to destroy the life of the part, it must always be regarded as a severe injury. In very young or very old subjects, or those who, on any other account, are very weak, it is apt to induce immediate sinking; especially when it affects the trunk, and more particularly the abdomen. In patients whose powers of action are stronger, the local irritation generally occasions very smart symptomatic fever; and when the integuments of the thorax or abdomen are affected, there is a risk of the membranes, lining these cavities internally, inflaming from their contiguity. The constitutional treatment must depend upon the circumstances of the case. If the patient is drowsy, with cold extremities and a weak pulse, spirits, wine, and other cordials should be assiduously administered, while the body is warmly covered and sources of artificial heat are applied to the feet. If, on the other hand, the ordinary symptoms of inflammatory fever should be present, the tartrate of antimony ought to be freely employed, and even the lancet may be required. The local treatment of burns has afforded a fruitful field for diversity of practice and opinion; some using cold applications and means of a sedative kind; while others, as Dr. Kentish, have insisted upon the advantage obtained from employing oil of turpentine, and different stimulants of this sort. It will be found, however, that there is not so much room

for doubt and question as may at first appear, since it is only in what may be called the first stage of burns, or that part of their progress which intervenes between infliction and ulceration, that any uncertainty exists as to the proper mode of treatment. If the injury is slight, that is to say, if the part affected still retains its vitality, I believe that cold applications and cotton will in general prove most useful; and if the texture of the part be destroyed, there can be nothing better than a poultice or the usual moist dressing, until the sloughs separate. In either case, ulceration, sooner or later, is established, and then the treatment will be the same for both.

Should the patient's strength prove inadequate to support the tedious and exhausting process of cure, if the part affected is seated on a limb, it ought to be amputated.

POISONS.

By Poisons, are understood agents which have the power of destroying the structure, or inducing disturbance in the actions of the body, independently of mechanical violence and temperature. Those which directly affect the structure, are named Escharotic Poisons, or simply escharotics. Of these. the most powerful are, the concentrated mineral acids, potass, and some metallic salts, as the nitrate of silver and oxymuriate of mercury. They are frequently used intentionally to remove morbid structures, etc., and are then named Caustics. Occasionally, whether from accident or design, they are applied so as to produce serious injury. In such cases, as their effect is generally completed before surgical assistance can be procured, the only treatment admissible, is that which promotes separation of the slough and healing of the sore. Poultices, until the first of these stages is completed, and then stimulating washes, afford most benefit.

Poisons, more strictly speaking, are those agents which produce their effects independently of chemical properties, as well as mechanical force and temperature; they do not directly alter the structure to which they are applied, but produce such changes in its natural actions as frequently give rise to the most important local and general consequences. A very large proportion of the articles comprehended in this class, are employed to produce their effects, in order to relieve the system from other diseases, whence they are named not poisons but medicines, the former title being reserved to denote those which are distinguished by the malignity of their action. The only poisons which present subject for surgical consideration, are afforded by the animal kingdom, and may be divided into: 1. Those which exist naturally in the animals that yield them; 2. Those which are the results of diseased action; and 3. Those which depend on changes after death.

Natural animal poisons are afforded chiefly by the two classes of Insects and Serpents. In this and other temperate climates, the effects of those of the former are hardly more than local, consisting of pain, swelling, and redness of the part injured. The treatment, when any is judged necessary, should also be local, and the solution of muriate of morphia, or that of acetate of lead with opium, *aqua ammoniæ*, and other preparations of ammonia afford most relief. There is considerable variety in the effect of these poisons, according to the irritability of the individual on whom they operate; and habit has a very remarkable influence in lessening it.

The poison of serpents produces more serious consequences, which vary according to the species which affords it. The most deadly sort occasions intense local pain, speedily followed by swelling of the limb, rapidly extending, and attended with mottled livid discoloration of the skin. The patient, almost immediately upon being bitten, feels sick, weak, and confused. He appears as if intoxicated, vomits, becomes quite insensible, and dies within a few hours, or it may even be minutes, after sustaining the injury. The viper, which is the only poisonous serpent in this country, hardly ever produces fatal effects; but the pain and swelling caused by its bite, are often extremely distressing.

The treatment must be both local and general. The former consists in opposing the entrance of the poison into the circulation; the latter, in counteracting its depressing effect on the vital powers. In accomplishing the first of these objects, the means of most use are: 1. Removing the poison from the body, either by cutting away the part, or destroying it with caustics or cauteries; the application of ammonia also seems to have some effect in preventing it from producing its characteristic effects; 2. Applying a tight ligature on the limb to compress the veins and other absorbent vessels; and 3. To direct the current of the fluids toward, instead of from, the injured part, by causing suction over it, which may be effected with the mouth or a cupping-glass. One or other of these proceedings may be trusted to chiefly, according to circumstances, but in severe cases, it is proper to combine the operation of the whole. The general remedies are such as tend to prevent sinking, by creating a sort of artificial strength through their stimulating property. Ammonia, given pure, or in the state of carbonate, with spirits and warm water, sufficient to make the mixture palatable, ought to be administered every five minutes. Arsenic has been strongly recommended also, as a remedy in such cases, and although it might be difficult to account for its salutary operation, the facts in proof of it are so striking and well-authenticated, that when circumstances permit, this means should certainly be combined with the others. The arsenate of potass, or Fowler's solution, is the most

convenient preparation for the purpose, and it appears that very large doses, even to the extent of two drachms, may be given every half hour.*

[In this country, the surgeon is often called on to treat the bites of poisonous serpents. Only a few, however, are really poisonous. The general plan is to purge the patient, and put him afterward on stimulants. In the bite of the rattlesnake, it has been found that brandy, whisky, etc., are its antidotes — *i. e.*, the stimulation of the liquor effects the cure. I have known cures effected in this way which had resisted other measures. If the poison once enters the circulation, the chances of recovery are small, I have known a patient to drink pint after pint of whisky (and who could not taste it), who had been bitten by a rattlesnake. Hence, when a person has been bitten by a venomous serpent, I would advise the free administration of spirits.—R. S. N.]

The morbid poisons originating in diseased action, which affect the human species, may all be produced by the human body; but two of them—cow-pox and hydrophobia—were, in the first instance, derived from the lower animals. They exist both in the liquid and in the gaseous state. In the former, they hardly act unless inserted or inoculated into the texture of the body. In the latter, they produce their effects when received into the lungs during inspiration. It is only the first or inoculated poisons which belong to the surgical department. They always occasion more or less irritation of the part to which they are applied, and generally afterward more or less constitutional disturbance. Their *modus operandi* is not at all known. They seldom cause any immediate local alteration; and days, or even weeks, may elapse before there is any indication of their action. The constitutional disturbance follows, and after being fairly instituted, it cannot be subdued by removing the part on which the morbid matter primarily acted. The effect of some of these poisons will be more particularly considered hereafter. At present, it may be observed, that the treatment proper for them, in the first instance, requires to be merely local, and should be conducted on the same principles of prevention as that of natural poisons. In regard to hydrophobia, it is believed that, if the injured part be cut out, or otherwise removed, any time before the constitutional symptoms appear, the patient will be certainly protected from them. [This view is erroneous, I believe.—R. S. N.]

The poisonous effects of dead animal matter are involved in considerable obscurity. It frequently happens that wounds received in the dissection of animals after death, whether for anatomical investigation, or the preparation of food, are followed by troublesome conse-

* Ireland Med. Chirurg. Trans., Vol. ii, p. 396.

quences, both local and general. It is observed that those which have a punctured form are most apt to be so. Sometimes there is violent inflammation of one or all the tissues in the neighborhood, from the skin to the bone, terminating speedily in suppuration or sloughing. In the finger, this constitutes what is called paronychia or whitlow. The absorbent vessels leading from the injured part often inflame, and by propagating their morbid action to the surrounding tissues, occasion hard painful cords under the skin, and red lines on its surface. Still more frequently the lymphatic glands in the course of the absorbents inflame and suppurate. At other times, the patient first complains of cold, shivering, headache, and vomiting of bilious matter, after which the usual symptoms of fever come on, and are generally characterized by extreme irritation, the pulse being excessively quick, the respiration very hurried, and the countenance unusually expressive of anxiety. Along with this derangement of the system, a diffused inflammatory blush appears in the neighborhood of the injury, from which it soon extends itself irregularly in various directions, and, terminating in mortification, proves fatal within a week, or little more; or the patient may die, as it seems, merely from the exhausting effect of the irritative fever, with very little local appearance of disease.

Since the effects of punctures now mentioned differ from each other very much in kind, and are subject to no less variety in the degree of their severity, while they are all occasionally produced, so far as can be ascertained, by the same circumstances, it has been inferred that they depend not so much upon a poisonous influence in the subject dissected, as on peculiar irritability of the individual injured.

In regard to the treatment, it may be observed: 1. That when punctures occur in suspicious circumstances, they ought to be converted into incisions, sucked, and touched with an escharotic. 2. That persons exposed to such injuries, ought to lessen, so far as possible, the irritability of the system. 3. That, when the effect is an acute and local inflammation, a free incision through the affected part affords most relief. 4. That, when the absorbents inflame, warm solutions of acetate of lead with opium have the most soothing influence. 5. That, when the lymphatic glands become affected, warm fomentations are the most powerful means of relieving the patient, which they do either by inducing the inflammation to terminate in resolution, or by hastening suppuration if it be inevitable. 6. That, when the constitutional disturbance precedes the local affection, and there are signs of great irritation, scarifications of the inflamed part, followed by hot anodyne fomentations, and accompanied with the internal administrations of calomel, opium, and cordials, though they may seldom succeed in curing this most dangerous condition, seem to have more tendency to do so than general bleeding, and the antiphlogistic regimen,

which usually, by increasing the weakness of the patient's system, increase its irritability, and render its treatment more unmanageable.

[The reader should carefully bear in mind, that Professor Syme bases his cure of inflammation on a false principle; hence his therapeutics are wrong.—R. S. N.]

CHAPTER XI.

AMPUTATION.

USE OF CHLOROFORM IN SURGERY.

The uncertain and not unfrequently injurious effects of ether which had been experienced during the short period of its employment for the prevention of suffering, rendered the introduction of chloroform as a substitute for this purpose, a boon of inestimable value in the practice of surgery. Surgeons of the present day, it is hoped, will seldom have an opportunity of witnessing the distress and difficulty dependent upon the patient's retaining consciousness under an operation; and the following observations are offered with the view of removing some sources of apprehension which have delayed the general introduction, and restricted the proper employment of an agent so important, not only to the patient, but also to the operator.

The chloroform must, of course be of good quality—such as that manufactured by Messrs. Duncan and Flockhart of this city—and should be administered, as was originally advised by Dr. Simpson, through means of a folded handkerchief held loosely over the patient's nose and mouth. The inhalation is apt, in the first instance, to cause a spasmodic closure of the glottis; and when this is denoted by cessation of breathing, the handkerchief should be held aside until at least one inspiration is accomplished. Children and young females frequently pass at once into the state of profound sleep desired; but adults, especially of the male sex, usually become much excited, so as to talk wildly, incoherently, and inarticulately, and resist inhaling the chloroform by muscular efforts of the most energetic character, before falling into the condition of complete immobility and insensibility. The congested countenance and convulsive contortions of the limbs on such occasions are apt to deter from completion of the process, but should rather suggest a more copious administration of the agent, until perfect flaccidity of the muscles and the stertorous sound of respiration, proclaim that its effect has been fully attained. The hand-

kerchief should then be withdrawn and reapplied occasionally so as to maintain the state of insensibility until the object of its induction is accomplished. However trifling this may be, the patient should always be placed in the horizontal posture, since syncope dependent upon temporary cessation of the action of the heart, which occasionally occurs, would be dangerous in the sitting or erect position of the body, and may probably have led to some of the fatal effects recorded, especially as most of these have occurred in cases of trivial importance, which of themselves would not have suggested the horizontal position. Ligatures on the throat, and tight articles of dress on the thorax, should always be removed; and if at any time the breathing is observed to become slow or cease altogether, respiration should be artificially excited by alternate compression and relaxation of the ribs, while fresh air is more freely admitted into the room, and cold water is thrown upon the face of the patient. It is seldom that such expedients are required, but the possibility of their being needed, should always be kept in mind, to prevent any risk of those fatal issues which, it is believed, never have occurred under proper management.

As to the cases in which chloroform should be employed, it may be said, that there are hardly any in which pain would otherwise be inflicted where its use is not desirable for the patient, and incumbent upon the practitioner to propose. At an early period of our information on this subject, it was thought that in a state of collapse or extreme depression from weakness, fatal sinking would be apt to result from the effect of chloroform. But so far from this being the case, it has been found that the most serious operations may be performed, under the influence of this agent, in circumstances of the most extreme exhaustion, with results infinitely more successful than could have been anticipated otherwise. Thus, the only example of permanent recovery after amputation at the hip-joint which has occurred in Scotland, was effected three years ago through the use of chloroform, in a case where I performed the operation upon a patient apparently about to sink under the exhaustion of disease, and who, instead of showing signs of depression from the liberty taken with his frame, awoke from his sleep with a smiling countenance as if he had experienced relief instead of mutilation.

In operations upon the mouth or nose and neighboring parts, involving these cavities, it has been generally deemed inexpedient to employ chloroform, lest during the patient's unconsciousness blood should enter the air passages and cause suffocation. Through careful attention to position and other circumstances, it has been found that the danger thus anticipated may be avoided; and if the operator is perfectly familiar with the whole process concerned, he almost always abstains from inflicting pain even upon occasions of this kind. But if

proper coolness and self-possession on the part of the surgeon and his assistants cannot be considered certain, it will be better to concentrate their attention upon the operation without any such embarrassment.

[Before entering into a descriptive account of amputation, and before the operation should be attempted, the surgeon should be in possession of all the preliminary information requisite to enable him to perform the operation safely and skillfully. In other words, he must be acquainted with the principles overlaying this part of surgery. The minutiæ of the process must be impressed on his mind. The most ridiculous failures often occur in consequence of the very little attention paid to the minutiæ, or apparently the less important part of surgery. The idea I wish to impress upon the student, may be well illustrated by the case of a young obstetrician, who had failed to learn the particulars of tying and separating the umbilical cord, and, in fact, leaving the placenta attached, delivered the child to the nurse to be washed and dressed. In this case, which is one of actual occurrence, the young gentleman had given too much attention to "turning," the "forceps," etc. And it is to be feared that young surgeons often neglect the minor parts of their profession, having been dazzled by the more important parts. Getting ready for an operation is quite as important, and as apt to be as badly managed, as the operation itself. One thing is very certain, viz: the surgeon who neglects his proper preparation, and who finds that he has forgotten either his bandages, dressings, instruments, or therapeutic agents, can never be a master of his art. The whole rationale and process of operation, must fill the surgeon's mind previous to its actual completion; or, to express the idea in a very plain way, *he must know what he is about.* The case of instruments cannot be in too good order; the conveniences which are to surround the patient, cannot be too perfect; the states of his mind and body are not to be unnoticed; and lastly, the surgeon *must not* amputate until the urgency of the case positively demands it. If a man must die of his injuries, why torture him with an operation? If the preservation of his life does not imperatively demand amputation, why lose the possible chance of healing the limb? Operations ought to be delayed until they are actually necessary. But when the surgeon is fully satisfied that an operation must take place, he should not hesitate.

There can now be no question as to the utility and humanity of using chloroform in most surgical operations. Anesthetics are, in reality, as safe remedies as any we use, provided they be used properly. *Pure* chloroform is preferred by me to either ether or chloric ether. There is to be some care displayed in the administration of all anesthetics, and particularly cholric ether and chloroform. The secret of success consists in affording the patient a due supply of natural air

while inhaling the chloroform. This is effected by removing the napkin used, occasionally during the process. The anesthetization should be deep and perfect. Under no circumstances should the operator administer chloroform without having in reach cold water, flannels, aqua ammonia, and alcohol. These will all be found useful if the patient should be found indisposed to rally. The stomach of the patient should be empty, and his mind at a state of rest. As soon as the chloroform has produced the desired insensibility to pain, the operation should be commenced; and if there is evidence of returning sensibility, it should be again administered. If the pulse sinks too much, the patient should have a smell of the liquor ammonia. The operator should be cool, self-possessed, and confident, and his operation should be as calmly conducted as if it was upon a subject in the amphitheater. The dressings should be simple, neat, and well applied; and, over all, let the surgeon not leave the patient until reaction has been fully established. Prof. Syme has given the processes of amputation.—R. S. N.]

AMPUTATION.

The expression Amputation, though sometimes applied to the excision of parts from the trunk, is generally confined in its meaning to the removal of limbs by the knife. In performing this operation, it is not sufficient merely to cut away what is diseased or injured, since the surface that remains ought to be left in such a state as will favor the healing of the wound, and afford a comfortable stump to the patient. Many different modes of operating have been contrived, with the view of attaining these objects; and there is no department of practical surgery into which more improvements have been introduced in recent times.

Amputation was anciently performed by the direct and simple process of cutting down at once to the bone, and sawing it through on a level with the soft parts. But it being found that in this way there was no covering provided for the bone, whence followed a tedious and imperfect cure, various modifications were introduced to supply the defect. The muscles were drawn up by metallic plates, or split cloths, and pieces of leather, called retractors. Cheselden drew back the skin after it was cut, and then divided the muscular parts higher up. This method of *double incision* was carried to an extreme by Mr. Mynors, of Birmingham, who dissected the skin, and turned it back like the sleeve of a coat. Louis cut the muscles by two circular incisions, so as to divide the portion nearest the bone higher up than the external layer. Alanson, by holding his knife obliquely, while he made the circular sweep through the muscles, cut them at once in the same form that resulted from two successive incisions.

The object of all these contrivances was to leave the soft parts

sufficiently long to cover the bone; but this they failed in accomplishing, excepting so far as concerned the skin; for the muscles, being in the first instance cut higher than the integuments, and subsequently becoming still more diminished in length by the unopposed effect of their contractility, could never be made to meet over the bone, which often protruded during the cure, and required to exfoliate or be shortened by the saw. Hence its permanent covering was merely a thin adherent cicatrix; and even in more favorable circumstances, when the integuments united over the bone, the covering of skin thus afforded to it, did not constitute a good protection.

The most simple and effectual plan for covering the bones properly was obviously to form one or more flaps from the part of the limb most able to supply them; and there can be no doubt that this mode of operating would have long since come into general use, had it not been that prejudice in favor of the circular incision directed the attention of practitioners almost entirely to improving it. The operation by flap was performed occasionally during the last century and a-half, and recommended by various surgeons who practiced it more or less extensively. Lowdham, of London, seems to have been the first of these, and he was followed by Verduin, Koenerding, Sabourin, and Vermale, and Ravaton. Toward the conclusion of last century, it was advocated by several of our countrymen in amputating the leg, of whom may be particularly mentioned Messrs. White, O'Halloran, Hey, and Alanson. Of late years it has come into general use in this country, chiefly through the example of Mr. Liston.

The great advantages of this method are: 1. That it is much more quickly performed, and consequently much less painful to the patient than the circular incision; 2. That it cuts the parts smoothly, and leaves them in a state favorable to union; and, 3. That it affords a much better covering for the bones than can be obtained from any modification of the other operation.

The flaps may be formed by cutting obliquely inward to the bone—by transfixing the limb and cutting outward—or by first cutting inward, so as to obtain one flap, and then outward, to form a second. The particular circumstances of the case, often render one of these modes preferable to the others; but when the surgeon has his choice, he will generally find transfixion the easiest method. The size of the flaps, and proportion of muscle and integument composing them, must be regulated by the thickness of the bone, and laxity of the soft parts. The flaps ought to be cut longer than would be sufficient to constitute a well-formed stump in the dead body, to compensate for the contractility of the living muscle. When the skin is loose, and the muscles attenuated, the surface of the flaps should be convex, to preserve the latter, and diminish the extent of the former tissue. When, on the

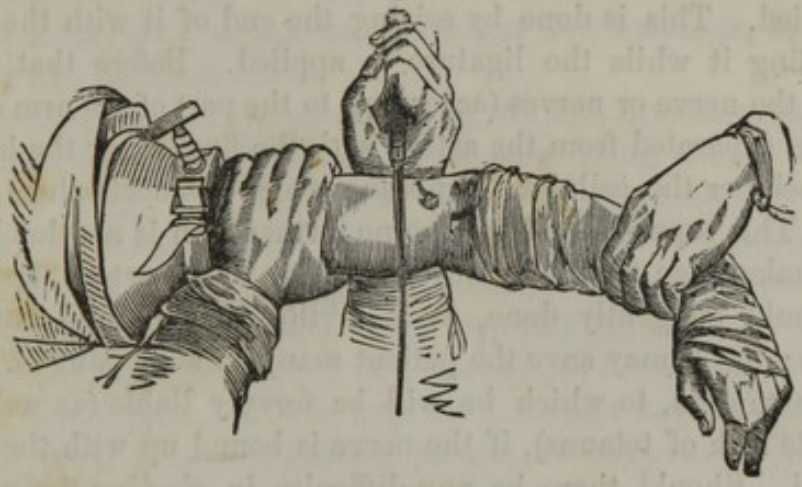
contrary, the limb is muscular, and the skin tense, the knife should be made to describe a concave line, to prevent redundance of muscle.

[The two operations may be clearly stated at this point, for the young surgeon cannot have too minute an understanding of the process of operating. If the

CIRCULAR OPERATION

Is the one to be performed, the surgeon, knife in hand, passes his hand under the patient's arm, bringing the knife completely over it toward himself, with the point downward, and proceeds with the first incision,

Fig. 14.



drawing the blade backward from hilt to point, completely round the limb, merely cutting through the skin and superficial fasciæ. The instrument is then laid aside, or handed to an assistant, and the integument loosened from the muscles beneath, by detaching the cellular membrane with scalpel or bistoury. The skin is now forcibly retracted further up, and another incision made, in the same manner as the first, as far up as the skin will permit, dividing all the flesh down to the bone. It is perhaps better to make both incisions somewhat elliptical—or rather twice varied from the circular direction—leaving the muscles longer both before and behind, than at the sides.

The next step is to separate the muscles from the bone for an inch or two, with the point of the knife (if a pointed one is used), or a scalpel; and apply a two-tailed retractor (which is made by slitting to its middle, a common bandage or strip of muslin, about a yard long, and three inches wide). The broader end is to be placed on the under side of the arm, passing the two tails up on each side of the naked bone, and crossing them at the top. The flesh is pulled up as far as possible on the bone by an assistant, who retains it there, by holding the ends of the retractor. A cut is then to be made all round the bone, close up to the retracted muscles, for the purpose of separating the periosteum. In commencing with the saw, place the heel on the

bone, where the periosteum has been thus separated, and draw it back, so as to have a slight groove for the forward motion. Then saw away steadily, but lightly. Let there be no roughness or hurry in this part of the business. The operator should have hold of the arm above the saw, while an assistant steadies the fore-arm, till the bone is divided, and the severed limb quickly put out of sight by the latter. The last few strokes of the saw should be short and gentle, to avoid splintering the bone. Should any splinters nevertheless occur, they are to be carefully removed by the bone-forceps or nippers, and the end of the bone made smooth.

The retractor is now to be removed, and the brachial artery taken up and tied. This is done by seizing the end of it with the forceps, and holding it while the ligature is applied. Before that is done, however, the nerve or nerves (according to the part of the arm divided), should be separated from the artery with the fingers, or the handle of the scalpel; or the cellular membrane which connects them, may be cut off. This separation should go no further than is absolutely necessary to make room for the ligature. Pulling at the artery for this purpose, should be gently done, as it is the most painful part of the operation; but it may save the patient many an after pang of the most intense neuralgia, to which he will be forever liable (as well as the immediate risk of tetanus), if the nerve is bound up with the coats of the vessel. Should there be any difficulty in *finding* the artery, in consequence of its retraction after division, the tourniquet is to be loosened a little, when a jet of blood will betray the spout. Seize it immediately, and renew the pressure above, till the ligature is applied. Then unscrew the tourniquet, and if there are any *arterial branches* necessary to be secured, the flow of blood through them will determine the fact, as well as their location.

As soon as the veins have ceased bleeding, let the stump be cleansed from all coagula, and *dressed* in the following manner: the flesh must be drawn down in a mass over the end of the bone, and the edges brought together in a horizontal line across the middle of the stump. There will be no necessity in this case for any sewing. The common adhesive plaster of the shops is sufficient, the straps to be about three-fourths of an inch in width, and long enough to turn over for four or five inches on each side. Place the first across the middle of the seam, taking care to have the edges of the wound exactly adjusted. Another is then fixed on each side of the first, at about a quarter of an inch distance, and more, if necessary, to keep the edges together in the horizontal line. One end of the ligature should be left long enough to hang out between the straps; and further space should be allowed between each for the exit of any matter that may form. Two straps should be laid obliquely across the others, covering

and pressing down the corners, so as to make a round smooth surface. Narrower straps may be applied, if necessary, to close any part of the lips that, having been left free, seem inclined to gape. Lastly, have one strap to go round the arm, binding down the ends of all the others; but not so tightly as in the least to retard the circulation.

Over the straps, the end of the stump should be covered with lint or cotton, kept on by a bandage lightly applied, but evenly, and so as to prevent the adhesive straps from being loosened by any lotions that may be needed, taking care again, however, not to obstruct the circulation. Let these dressings be kept constantly wet with cold water, or medicated cooling lotions, should the tendency to inflammation require them, such as spirits, or vinegar and water, or, in bad cases, the salt and camphor lotion.

If no disagreeable symptoms occur, the first dressing may be left on for several days, any discharge that exudes being simply wiped away from the straps. In from four to five days, according to circumstances, the amount of the discharge, feelings of the patient, etc., the dressings should be removed. The straps are to be taken off one by one, the edges of the wound being carefully supported by the hand of an assistant, to prevent their falling apart, as the adhesion at this time will be but feeble. In this way the dressings may be renewed from time to time, until the healing process is complete. Care must be taken, however, not to disturb the ligature for six or seven days. After a week, it may be gently pulled, and if it seem to move easily, taken out. But if it still appear firm, let it alone. No force need be used: it will eventually come away of itself. These directions presuppose the silk or linen ligature. It is better to have it made of animal membrane, as that will lie soft in the wound and may be wholly absorbed. The pain attending the traction of the ligature upon the arteries is peculiar and most excruciating.

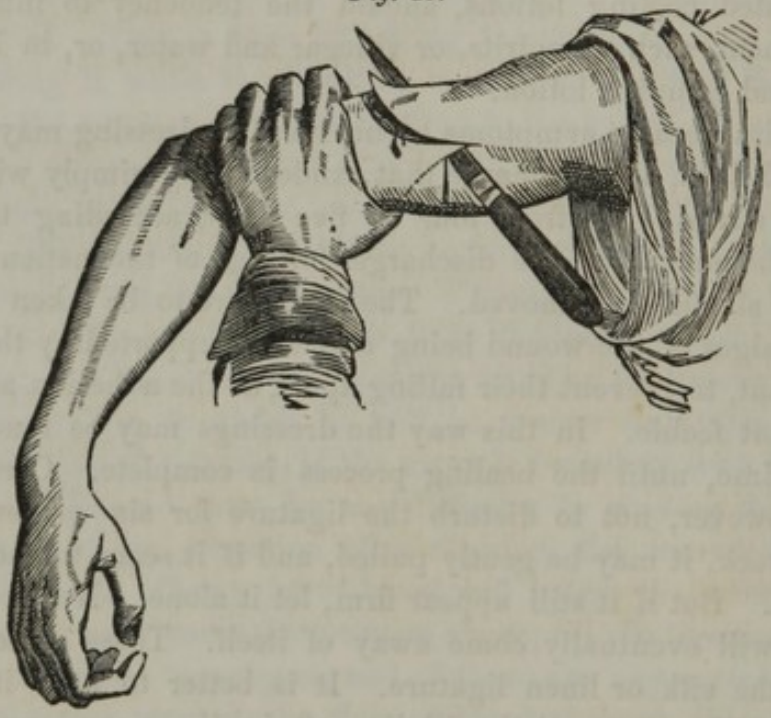
FOR THE FLAP OPERATION,

The patient is placed in the same position, and the forearm bandaged and held by an assistant, as for the circular method. It is still best to have another assistant to draw back the skin, just as before directed, as this will obviate the accident of having muscle protuding between the skin of the flaps, which frequently occurs when the precaution is neglected. The flaps themselves had better be taken from before and behind than from the sides.

The point of the knife is entered at one side, with the blade held horizontally, and passed on, penetrating directly to the bone. It is then turned a little forward—the muscles being drawn up in front—and pushed over the bone, or rather half round it, the point being de-

pressed, and emerging from the other side, just opposite to where it entered. By proceeding in this way, the bloodvessels are left behind the knife, to be divided when the second flap is cut. When the blade is fairly through, with the edge looking toward the elbow, it is made to cut downward and outward to the surface, making the first or front flap about two and a half or three inches in length. The point is then re-entered in the wound about three-quarters of an inch below the former point of entrance, passed on to the bone, round it behind, and out through the former wound a little lower than before.

Fig. 15.



The edge is then brought downward and backward to the surface, making the posterior flap of equal length to the anterior. The flaps are now held firmly back by an assistant, and the edge of the knife made to sweep round the bone, to detach any remaining fibers. It is still better to detach the muscles from the bone, with a scalpel or bistoury, a little further up, and to hold back the flaps with a retractor, as in the circular operation, though it is not here so essential. The periosteum is then to be separated as before, and the bone sawed off as high up as convenient.

The *artery* — which, in cutting according to the directions above given, will generally be found in the posterior flap—being secured, and the tourniquet removed, the wound is cleansed, and the edges of the flaps brought exactly together, and secured by adhesive straps. There will be less tendency to gaping of the wound, or protrusion of corners, than in the former operation. If the proper judgment be ex-

ercised, the flaps may be made to meet in a line across the middle of the stump. This, however, is far from being the case with many operators. I know one distinguished surgeon who, in three or four successive flap operations, was obliged to *trim* the flaps, in order to make them meet. This had better be done than to leave badly fitting flaps; but it looks very cruel, as well as awkward; and every surgeon should have *eye* enough to avoid the necessity for it. Surgery is, in one sense, a mechanical art, and surgeons must be mechanics. It is a science also, but he who has no judgment and skill for mechanical operations, will hardly succeed as a surgeon.

The directions about the *ligature* and *dressings*, given for the circular operation, apply equally in this case. It is still more necessary that the straps and bandage should keep the larger fleshy mass of the flaps together.

The treatment, after amputation, does not differ from that of any other incised wound. The peculiarity of the case, if any, is rather *constitutional* than local. The removal of a considerable part of the limb, *tends*, in some degree, toward plethora in the smaller system left, supposing the stomach, heart, and lungs to produce and elaborate as before. This has been noticed in some cases to occasion a complete and not unfavorable change in the person's constitution. Generally, however, the whole physiological system appears to accommodate itself to the new state of things with surprising facility; though it is long before the individual's mind is so reconciled as to acquire a familiar consciousness of his new bodily condition. He is often caught in the attempt to walk on the leg, or strike with the hand—that is in the grave!*

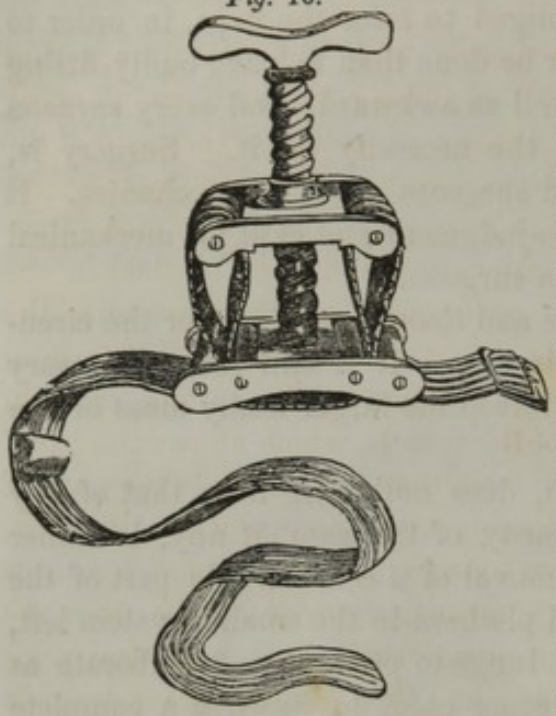
The best knife for amputating fingers and toes is the bistoury. For the limbs, a larger blade is of course required; its length ought to be about a half more than the diameter of the part to be subjected to operation. It should be blunt on the back except for about an inch and a half from the point, which must be thin and sharp, and varying from four to eight inches in length. Three sizes will be found sufficient.

For restraining hemorrhage during the operation, there are three means which may be used. The first of these is the tourniquet or turn-stick, invented by Morel, consisting of a strap or bandage carried twice round the limb, encircling a firm roller, or other suitable compress placed in the course of the artery, and a piece of wood, which, being inserted between the turns of the bandage, when twisted, effects any degree of constriction that may be required. The second is a

* Eclectic Surgery.

modification of this apparatus, contrived by Petit, who, instead of the turn-stick, used a screw and a couple of plates, which, being separated by turning the handle, effected the pressure more gradually, and so as to dispense with the services of the assistant who was employed to hold the turn-stick. This screw tourniquet, variously modified and improved, is the instrument still generally used for the purpose. The third mode of commanding the vessels, is by simply compressing them with the hands. In certain amputations this is the only means that can be used, owing to the proximity of the operation to the trunk; and some surgeons, from the facility and dispatch attending it, never employ a tourniquet on any occasion. In cases where the tourniquet can be applied without doing harm, it ought to be preferred, as it relieves the assistant from a fatiguing duty, and prevents the patient from losing so much blood as he is apt to do when the vessels are subjected to manual pressure, if many of them require to be tied, or there is any unsteadiness, either on his part or on that of the assistant. The arteries ought to be pulled out with the forceps, and tied quite detached from their neighboring connections. After the principal vessels are secured, the tourniquet ought to be entirely removed, to prevent its slackened band from exerting such pressure on the veins as may cause them to bleed, and induce the surgeon to tie them instead of arteries.

Fig. 16.



The earlier modes of amputation rendered union by the first intention impracticable; and when the operation had been so far improved as to retain the soft parts sufficiently long to meet over the bone, the old system of dressing still continued in use, and the cavity of the stump was stuffed with lint, as all wounds were in those days healed by the granulating process. Mr. Alanson had the merit of exploding this practice, and introducing light superficial dressings in its stead, which greatly shortened the cure, and though surgeons on the Continent still interpose dressings between the edges of the stump, union by the first intention is always sought for in this country. Stitches, if necessary, ought to be employed to keep the lips of the wound nearly in their proper position; and when the bleeding has ceased, strips of adhesive or isinglass plaster may be used to retain them in

accurate contact. The bad consequences of the operation are chiefly hemorrhage, sero-purulent effusion into other parts of the body, especially the cavity of the thorax, suppuration of the stump, and exfoliation of the bone.

Hemorrhage may appear immediately after the operation, either from arteries which have not been tied, owing to their not showing themselves by bleeding during the state of collapse succeeding the removal of the limb, or from the veins being compressed by too tight a bandage. In the former case, it is necessary to apply as many ligatures as may be requisite; in the latter, it is sufficient to slacken the bandage. Hemorrhage sometimes commences a few hours after the stump is dressed, and then depends either upon a general oozing from the cut surface, consequent upon the reaction of the system, or upon some imperfection in the ligature of the vessels, which allows the blood to escape when impelled with more force than it was while the patient remained weak and faint. Cold lotions and pressure will restrain it, if proceeding from the first of these sources; but additional ligatures will be required, if, resisting such means, it proves to be from the second of them. The hemorrhage occasionally does not occur until the third, fourth, or even seventh day; and then almost always depends upon ulceration of the artery. In this case, as ligatures cannot be applied to the orifices of the vessels with any advantage, owing to the morbid state of their coats, the bleeding must be arrested either by pressure, effected through means of compresses introduced into the stump, and a tight bandage applied externally, or by tying the trunk of the artery. The former of these methods is greatly preferable, when adequate to the purpose, which, with very few exceptions, it is found to be.

When the stump does not unite, but inflames and suppurates, fomentations ought to be frequently applied, until the discharge is fully established, when stimulating washes and pressure must be employed to support the weakened action of the granulating surfaces, and make them unite together.

Purulent effusions into internal cavities occur chiefly in weak, debilitated, irritable subjects, and have been accounted for variously. They are known to result in such habits from excited action, whatever be the cause producing it; and there is reason to believe that, if amputation has more frequently the effect of occasioning this disturbance than other wounds of the same extent, it is owing to the disturbance which it causes by suddenly removing a large part of the body. Inflammation of veins has also been supposed to be the cause of this occurrence. There are no means of remedying such effusions, and the only way of avoiding them, is, in the first place, to avoid operating in circumstances which predispose to such occurrences; and, in the second, to control diligently from its commencement, by small bleedings, opiates, and the

tartrate of antimony, the constitutional excitement which precedes them. [I have already shown that this course is not proper — the reader will understand why.—R. S. N.] Exfoliation of the bone is a troublesome occurrence, not only from delaying the process of cure, but by tending to render it imperfect through the retraction of the soft parts composing the stump, which gradually takes place in the event of their not uniting over the extremity of the bone. It sometimes depends upon the injured or diseased state of the limb, and may also be occasioned by too free removal of the periosteum, rough use of the saw, or deficiency in the covering left for the bone. The most common form is here represented, being merely a ring from the circumference of the bone, with irregular spicular prolongations upward. But occasionally the exfoliation is much more extensive, as in the second figure, which is taken from one that separated in a case of amputation above the elbow, on account of shattering of the arm by machinery.

Fig. 17.



Fig. 18.



THE FINGERS.

The fingers may be amputated either at the joints, or through the phalanges. There used to be a strong prejudice against leaving an articular surface, the cartilage of which was thought to exfoliate necessarily, so as to render the cure more tedious and troublesome. Disarticulation was, therefore, avoided as much as possible, and when, from any circumstance, it appeared to be inevitable, the precaution was taken of scraping off the articulating cartilage. It is now well ascertained that union by the first intention generally occurs as readily after disarticulation as after amputation through the shafts of bones, and that when it does not take place, the only inconvenience experienced from the cartilage is a little increase and longer continuance of the irritation. The stump swells, and discharges thin sero-purulent fluid in considerable quantity, often together with small scales of cartilage floating out from the cavity. Such being the case, though it would be wrong to amputate through a joint by preference, still, when there is any lasting advantage to be gained by doing so, the chance of bad consequences, so trivial as those just mentioned, ought not to be

regarded as a sufficient objection to it. When the distal phalanx alone of a finger is affected, it ought to be removed by cutting into the joint on the dorsal surface, dividing the lateral ligaments, and then carrying the knife forward parallel with the palmar surface of the bone, so as to save a flap to cover the stump; or the operation may be reversed by transfixing the finger, while its palmar surface is turned upward, forming the flap, and then cutting through the joint. When the finger requires to be amputated above this joint, the operation should be performed by making two semilunar incisions, one on each side, so as to form two lateral flaps, which being dissected back, will expose the bone, and allow it to be divided by the saw, or what is better, the cutting-pliers.

The flaps are then made to meet together over the face of the stump. The second phalanx might be removed at the joint in the same way as the first; but as the portion of the finger thus left would be neither useful nor seemly, it is better, unless the patient refuses his consent, to take away the whole of it at its metacarpal articulation. In doing this, while the other fingers are held aside, the surgeon should place the point of his knife exactly over the summit of the joint, and cut first on one side and then on the other, obliquely into the palm of the hand to the point opposite that from which he set out, taking care to keep exactly in the angle formed by the integuments connecting the fingers. The flaps being detached, he may readily pass the point of his knife round the head of the bone. Lisfranc makes one flap first, then carries his knife through the joint, and completes the operation by cutting outward. When the parts retain their natural laxity, this proceeding is equally easy and expeditious; but if they are thickened and indurated, as is generally the case, the second flap is very apt to be injured in detaching the head of the bone; and even in the most favorable circumstances, it is much more difficult to adapt the flaps properly to each other in this way, than in the one just described. One or two stitches are often useful in keeping the edges of the skin in contact. Of all the operations for amputating fingers this is the most important, from the frequency of cases requiring its application. The *distal* phalanx, it may be said, never stands in need of removal by itself, since all the morbid conditions to which it is subject from injury or disease admit of reparation; and it is of course always advisable to retain the extremity of the finger with its protecting nail, even though the bone, in whole or part, may be taken away.

Fig. 19.



And when more than the distal phalanx must be removed, it is almost always better, in respect to appearance, as well as use, to amputate the whole fingers.

When a portion of the metacarpal bone requires to be removed, the best method is to apply the point of the knife at the part where the bone requires to be divided, and cut down on each side of it, in the angle formed by the integuments between the fingers, so as to make the incisions meet below, opposite the metacarpo-digital articulation; and then divide the bone by means of the cutting-pliers here represented, which were introduced into the service of surgery by Mr. Liston, at an early period of his practice, and, from their extensive utility, may be regarded as the most valuable addition that has been made to the modern armory of the profession. When the metacarpal bone of the thumb is the one concerned, a portion of it may be removed by making two incisions, commencing where the bone requires to be divided, inclosing the thumb, and meeting together at the angle of union between it and the fore-finger. If it is necessary the whole bone may be easily disarticulated. The thumb and fore-finger being held separate, the surgeon should cut upward in the angle between them as far as the bones will allow him, then, turning the edge of the knife laterally, he will at once enter the joint, and having cut through it, may readily form a sufficient flap to cover the raw surface in carrying his knife outward. The same processes are proper for removing the metacarpal bone of the little finger, in part or in whole; but in this case the external flap must be formed previous to the disarticulation, which is most readily effected by introducing the knife into the joint from the ulnar side.

Fig. 20.



After all these operations, the arteries which are found to require ligatures must be tied; and the pressure of lint compresses, supported by proper bandages, will generally supersede with advantage both stitches and plasters.

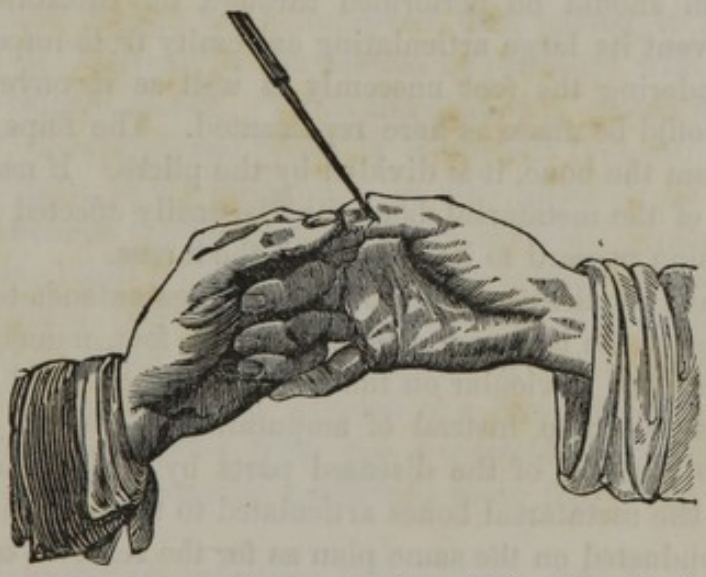
[After what has been said by Professor Syme, it is unnecessary for me to go into details. Plates often give as complete an idea of an operation as a description. As Professor Syme has remarked, it is generally preferable to amputate the fingers rather than their extremities; but cases may occur in which it will be sufficient to take off merely the first joint, as in the plate below.

Fig. 21.



The bleeding of the digital arteries, which may be considerable, is easily suppressed by twisting their extremities with a pair of small forceps. No matter where the amputation is to take place, as soon as the hemorrhage has ceased, the cut surfaces should be washed clean, wiped dry, and placed in actual and accurate contact. Stitches or strips of plaster may be used, to hold the flaps in position. The object is to secure union by the first intention, which can be generally accomplished. Operations on the thumb may be performed either at the phalangeal joints, or between them. The following plate shows the operation at this joint:

Fig. 22.



For the *carpo-metacarpal* amputation of the thumb, begin an incision on the back of the hand a little above the upper extremity of the metacarpal bone of the thumb, continuing it down between the thumb and fore-finger. Introduce the point of a narrow bistoury or scalpel at the lower extremity of this incision, passing it up under the metacarpal bone, so as to bring the point out where the first incision began (see Fig. 23,) with the edge looking toward the end of the thumb. Then cut outward and downward, so as to make a good flap from the palmar surface to cover the part after the bone is removed. The bone can be readily separated from the trapezium and wholly

removed. To arrest the hemorrhage, it will generally be necessary to take up one or more small arteries. Secure the flap in place by adhesive straps, apply your bandage, and support the hand in a sling.—R. S. N.]

Fig. 23.



The toes ought to be amputated on the same principles; but, with the exception of the great one, which may be removed through the joint of the first and second phalanx, it is always proper in removing them to perform disarticulation between the first phalanx and metatarsal bone, since the small portion that might be allowed to remain could be of no use, and in all probability would occasion lameness. When more of the great toe than the distal phalanx requires removal, the operation should be performed through the metatarsal bone, in order to prevent its large articulating extremity from impeding recovery, and rendering the foot unseemly as well as inconvenient. The incisions should be made as here represented. The flaps being then separated from the bone, it is divided by the pliers. If necessary, disarticulation of the metatarsal bone may be easily effected by prolonging the incision upward to its joint with the tarsus.

The disease requiring amputation sometimes extends to the tarsus, but is limited to the bones on one side of the foot, namely, the internal cuneiform and navicular on the tibial, and the cuboid on the fibular side. In this case, instead of amputating the leg, it is better to make a free removal of the diseased parts by taking them away together with the metatarsal bones articulated to them. The operations should be conducted on the same plan as for the removal of a metatarsal bone by itself, and will be found hardly more difficult or serious. Partial amputation of the foot may also be performed transversely through the metatarsus, between the metatarsus and tarsus, and through the tarsus. The first and second of these methods are very seldom admissible, owing to the disease which requires removal of a part of the foot, generally extending so far as to encroach upon the bones where they would need to be divided; and they are also objectionable from the difficulty which attends their execution, while there is no counterbalancing advantage in their favor, since, when once the anterior extremity of the longitudinal arch of the

foot is taken away, no additional inconvenience results from removing a larger portion, so long as the posterior extremity or heel is allowed to remain. It has been objected that the extensor muscles of the ankle-joint having no opponents left attached when amputation is performed through the tarsus, must draw up the heel and point the cicatrix to the ground. But experience has proved that any such unpleasant consequence is effectually prevented by the flexor tendons adhering to the cicatrix; and the patient has no difficulty in adapting to the stump an artificial foot, or stuffed shoe, with the assistance of which he walks nearly free from lameness.

Fig. 24.



OF THE FOOT.

It is unnecessary here to consider the original operation of Mr. Hey, of Leeds, in which the foot was divided between the tarsus and metarsus; since, though much improved, and, indeed, it may be said perfected, by M. Lisfranc, it can seldom be practiced with advantage; for caries, I believe, never. When the disease is seated in the proximal heads of the metatarsal bones, it is obvious that the distal range of the tarsus must in all probability be also affected; in which case amputation between the tarsus and metatarsus could remove only part of the disease; and when the farther extremities of the metatarsal bones are carious, there is seldom more than one affected, so that amputation of it along with the corresponding toe is sufficient. The operation of Chopart, which divides the foot through the tarsus, separating the *astragalus* from the navicular, and the *os calcis* from the cuboid bone, may be performed more frequently and advantageously.

According to the observations I have been able to make on this point, when caries occurs in the foot, unless it affects all the bones of the tarsus, which is rarely the case, it is confined in general, to one of the three following situations: 1. The articulation between the bones of the leg and the *astragalus*, *i. e.*, the ankle-joint; 2. The articulation between the *astragalus* and *os calcis;* 3. The farther ranges of tarsal bones, and neighboring heads of those of the metatarsus. In this last situation, the disease, whether existing in the heads of the metatarsal bones, the cuneiform or the navicular and cuboid, is completely within reach of an amputation, which leaves only the *os calcis*, and *astragalus*. Considering the great importance of preserving the

heel, in respect both of utility and appearance—to say nothing of the patient's feelings, who would of course much rather part with the half of his foot than the half of his leg, it seems extraordinary that this operation should not hitherto have been introduced into the practice of British surgery. As there can be no doubt that this neglect has proceeded from too readily receiving the theoretical objections which have been urged against the operation, I shall endeavor to state them fully, and ascertain what weight they deserve.

It has been said, that the operation is difficult and painful—that the cartilaginous surface which remains, is adverse to healing—that the extensor muscles of the ankle, from want of their usual opponents, the attachments which must be cut away, will pull up the heel, and point the face of the stump to the ground—and that even though not prevented in this way from being of use in supporting the body, the part of the foot which is saved, cannot be more convenient than an artificial limb.

The difficulty attending Hey's operation, even with all Lisfranc's ingenious devices for discovering the seat of the different articulations and dividing the ligamentous connections, is certainly considerable, and might perplex even a practiced operator. But in amputating through the tarsus, so as to separate the navicular bone from the *astragalus*, and the cuboid from the *os calcis*, the disarticulation may be performed with ease and certainty, if the simple directions, to be afterward given, are attended to. The operation can be performed in a few seconds, as the incisions succeed each other without any necessary delay for changing instruments, and is therefore much less painful than amputation of the leg. In regard to the cartilaginous surface, it is now well ascertained, that when it is sound, the apprehensions of bad consequences from such a source are either entirely without foundation, or, at all events, greatly exaggerated. After this very operation, I have seen the wound heal kindly by the first intention. The risk of elevation of the heel by the action of the gastrocnemius, and other extensor muscles does seem, at first sight, a very serious objection, which, I confess, weighed so much with myself as to make me hostile to the operation, until I happened to see a patient in the hospital at Gottingen, on whom Langenbeck had recently operated. In this case, there was no distortion, and I was assured that none had happened in several other cases of the same kind. The reason of this at the same time appeared, viz: the tendons of the *tibialis anticus* and extensors of the toes finding new attachments to the extremity of the stump. *Lastly*, as to the objection, that the portion of foot which is saved, will be of no more use than an artificial leg, I think if it is recollected that, by the operation in question, there are two joints preserved, which must greatly diffuse the force of any shock sustained by the

foot, there can be little hesitation in admitting that the patient's comfort and facility in walking must be very much superior.

When the operation is to be performed, a tourniquet ought to be applied; and as it is always proper to compress vessels as near as possible to the part where they are to be divided, the pad should be placed over the posterior tibial artery, just above the ankle. Various minute directions have been given for determining the position of the joints. But the following very simple observation, will, I am sure, be always found quite sufficient for the purpose. If the surgeon casts his eye upon the space between the outer ankle and head of the metatarsal bone of the little toe, he may easily ascertain the middle distance of these points; and this is the situation of the joint between the *os calcis* and cuboid bone. The other articulation, viz: that of the *astragalus* with the navicular, lies very nearly in the same transverse line; and the projection of the latter bone, renders its discovery still more ready and certain. The flaps may be formed either entirely from the sole of the foot, or partly from it, and partly from the integuments of the instep; but the former plan is preferable, as affording a better covering for the bones. In this case, it is necessary to make the flap extend fully to the balls of the toes, or farther extremities of the metatarsal bones; and it is here that one is most apt to go wrong, by cutting the parts too short for forming a good stump. In making the incisions, it is recommended to effect the disarticulation before making the flap from below; but I have uniformly found in operating on the dead subject, that it was extremely difficult in this way to cut it smoothly, owing to the relaxation of the parts in the sole of the foot, which ensues upon the separation of the bones. It is much better, therefore, to transfix the foot from side to side, and complete the section of the flap before opening the joints, while the parts are held steady under the knife. After this analysis of the operation, it may be well to give a connected account of the mode of performing it.

The surgeon having recognized the position of the joints, should place the points of his thumb and fore-finger upon them, embracing the foot in his hand; then, with a small sharp-pointed amputating knife, blunt on the back, make an incision from the one to the other, slightly curved toward the toes, in order that it may correspond to the flap below; and next, instead of opening the joints, run his knife through from side to side, between the bones and flesh of the sole, and cut forward close to the bones, until he arrives at the balls of the toes, when he terminates the incision, not abruptly, but gradually, so as to have a smooth edge and surface. Nothing now remains but the disarticulation, which may be effected with extreme facility, as the surfaces of the joints are nearly straight, and in the same line.

The anterior tibial and external plantar arteries require to be tied;

after which the flap being stitched into its place, compresses and a bandage ought to be applied. The limb during the cure ought to be bent to relax the gastrocnemius.

Case I.—Ann Stewart, ten years of age, was admitted into the Surgical Hospital on the 4th day of June, on account of a disease of the foot, which had existed two years, and assumed so serious an appearance, as to have made amputation of the leg appear necessary. There was considerable thickening in the whole course of the tarso-metatarsal articulation; and an opening over the middle cuneiform bone allowed the probe to pass through this extent, at every part of which the characters of caries were recognized. As the parts seemed quite sound at the first range of tarsal joints, I resolved to save part of the foot by amputating here. The operation was accordingly performed in the way that has been described, and the result proved most satisfactory. The wound healed by the first intention, and the patient was able to put her foot to the ground in a fortnight, when it was observed that she retained the power of counteracting the extensors of the ankle, owing to the flexors having already acquired new attachments. She has now got a sort of artificial foot, which is extremely simple, and answers the purpose very well. It consists of a boot of the usual form and size, and made of stout cotton cloth, reaching a little higher than the ankle, and lacing in front. The sole and instep are rendered unyielding by a thin plate and hoop of iron, and the whole of the cavity is stuffed with some soft material, except the space required for receiving the stump. This boot being put on over the stocking, is worn under an ordinary leather one; and the patient can walk, run, sit, and stand so naturally, that no person unacquainted with the condition of her limb would observe any defect in it.

Case II.—William Gemble, printer, aged twenty-four, a tall, thin, unhealthy-looking young man, of a dark complexion, and dissipated appearance, entered the Hospital, August 31, on account of pain and swelling of the foot. The swelling existed chiefly at the inner or tibial side of the instep, where there was an obscure sense of fluctuation, but also extended across, though not so prominently, to the outer edge. He had observed pain and enlargement for eighteen months, and had used blisters and leeches, but did not experience any considerable pain in it until a few weeks before the time of his admission, during which he had been confined to the house, and prevented from following his employment.

In order to check the progress of the disease, I applied the actual cautery, but without success. An abscess formed at the inner side of

the foot, and when it was opened, the tarsal bones were found to be extensively diseased. In these circumstances, I proposed the partial amputation of the foot, but could not prevail upon the patient to submit. He returned home, but came back again on the first of September, with his mind made up to undergo the operation.

The foot now presented a much more formidable appearance. Abscesses had opened in the sole, as well as at other parts, and the swelling was greatly increased; still, however, there was no indication that the ankle-joint, or the joint between the *astragalus* and *os calcis* was affected, and I therefore performed the operation, as in Stewart's case. The cartilaginous surfaces were found entire, but, as they were somewhat discolored, I thought it right to cut them off with the pliers.

The patient did pretty well for two days, with the exception of complaining of pain in the stump, and having a very frequent pulse. A very profuse bleeding then ensued, and was arrested by the application of cold and pressure. Next day there was a return of hemorrhage, and the stump was not only much inflamed, but beginning to slough at the edge of the flap. I carefully extracted all the clots, and introduced a piece of caddis between the *os calcis* and flap, which was the part whence the blood issued; graduated compresses and a bandage were then applied, and the case proceeded favorably afterward, and, though the patient made a tedious recovery, he ultimately got quite well, and was dismissed on the 13th of November.

He is now able to walk with great ease, and with hardly any visible lameness.

The operation through the tarsus, which was invented by Chopart, had been much neglected, owing to the hypothetical objections just mentioned, but deserves to come into more general use. I performed it first about twenty years ago, and have frequently repeated it since that time with almost invariable success.

The blade of the knife employed should be about six inches long, and half an inch broad, sharp at the point, and blunt on the back. The tourniquet ought to be applied immediately above the ankle, having compresses placed over the posterior and anterior tibial arteries. The surgeon should measure with his eye the middle distance between the *malleolus externus* and the head of the metatarsal bone of the little toe, which is the situation of the articulation between the *os cuboides* and *os calcis*. Placing his fore-finger here, he ought to fix his thumb on the other side of the foot, directly opposite, which will show him where the *os naviculare* and *astragalus* are connected. An incision somewhat curved, with its convexity forward, is then to be made from one of these points to the other, when, instead of proceeding to disarticulate, the operator should transfix the sole of the foot from side

to side at the extremities of the first incision, and carry the knife forward, so as to detach a sufficient flap, which must extend the whole length of the metatarsus to the balls of the toes. The disarticulation may finally be completed with great ease, as the shape of the articular surfaces concerned is very simple, and nearly transverse.

The external plantar, anterior tibial, and any other arteries that require to be secured, must then be tied, and the flap having been secured in its place by a few stitches, some light dressing ought to be applied. During the cure the knee ought to be kept bent to relax the *gastrocnemius*.

Case III.—J. Wood, aged sixteen, recommended by Mr. Aitchison of Dunbar, was admitted into the Royal Infirmary on the 8th of September, suffering from disease of the foot, which had suppurated and ulcerated, in consequence of a twist he had given it in walking, about twelve months before. On the instep, which was very much swollen, there were two openings that permitted a probe to enter freely into the substance of the tarsal bones, and more particularly the astragalus and os calcis. In these circumstances, it was plain that the patient, already much emaciated and reduced in strength, had no chance of recovery except from amputation.

As the disease extended beyond the limits of Chopart's operation, it would have been necessary, in accordance with ordinary practice, to remove the leg below the knee, but as the ankle-joint seemed to be sound, I resolved to perform disarticulation there. With this view, I cut across the integuments of the instep in a curved direction, with the convexity toward the toes, and then across the sole of the foot, so that the incisions were nearly opposite to each other. The flaps thus formed were next separated from their subjacent connections, which was easily effected, except at the heel, where the firmness of texture occasioned a little difficulty. The disarticulation being readily completed, the malleolar projections were removed by means of cutting-pliers.

The patient suffered no constitutional disturbance or any alarming symptom after the operation, but recovered slowly, as was to be expected from his general weakness, and the unhealthy state of the soft parts composing the stump. A small slough separated from the edge of the lower flap, in which, as well as the upper one, I found it necessary, during the healing process, to make a counter opening for the free discharge of matter. He was dismissed on the 2d of December, and I learn from Mr. Aitchison that he continues quite well. The wounds are soundly healed; and any degree of pressure can be borne by the stump, which has a round form, well suited for the adaptation of a boot or artificial foot, and is strongly protected from external injury by its thick integuments.

The result of this case is very encouraging to the performance of amputation at the ankle-joint—an operation of greater importance than at first sight may appear, since, if found to be practicable with safety and success, it should, in a great measure, supersede amputation of the leg below the knee. The circumstances requiring the last mentioned operation seldom affect the leg itself, because, if so seriously injured or diseased as to require amputation, it must almost always be removed above the knee. But while compound fractures and malignant tumors of the leg are thus in general subjects for amputation of the thigh, diseases and injuries of the foot have too frequently led to the amputation of the leg. Modern surgery, no doubt, has circumscribed this field for the operation, by introducing partial amputations of the foot; but there still remain cases of no rare occurrence, which are held to demand its performance.

When caries attacks the metatarsal articulations of the toes, it is usually confined to a single joint, that of the great toe being the one by far most frequently affected; and Mr. Liston's happy employment of straight cutting-pliers, instead of the variously-formed saws, previously in use, for dividing the bones, has rendered removal of the disease from this situation so easy, that the old practice of amputating the leg on such occasions seems hardly credible. If, again, the caries be seated at the other or proximal extremity of the metatarsus, it is sure to engage also the adjoining tarsal bone or bones, and therefore the operation suggested by Mr. Hey, of Leeds, which was to disarticulate the metatarsus from the tarsus, is not applicable. In many cases, however, as only one of the tarsal bones is engaged, it may be taken away with the corresponding part of the metatarsus, so as to render the foot merely narrower without diminishing its length. Thus, the first metatarsal is removed along with the internal cuneiform bone, and the os cuboides with the two metatarsal bones articulated to it. But the operation of Chopart, which leaves only the astragalus and the os calcis, is the most valuable of all partial amputations, as it commands the largest portion of the foot requiring removal for disease or injury, and, at the same time, preserves a support for the patient not less useful than that which is afforded by the whole of the tarsus. Its introduction was long opposed on the ground that the extensor muscles of the ankle, acting through the tendo Achillis, when no longer antagonized, would draw up the heel and point the cicatrix toward the ground. I performed this operation in 1829,* so far as I know for the first time in Great Britain, and have frequently done so since, with the most satisfactory result, no inconvenience having ever been

* Quarterly Report of the Edinburgh Surgical Hospital, Edin. Med. and Surgical Journal, 1842

experienced from the source just mentioned, as the cut extremities of the tendons on the fore part of the joint speedily acquired new attachments, enabling them to counteract the extensive power.

But when caries affects the astragalus, or os calcis, or, as very frequently happens, is seated in the articular surface between these bones, no form of partial amputation can be of any avail, and attempts to cut out the diseased bone generally prove unsuccessful. In cases where the tuberosity of the os calcis is alone affected, excision may be executed completely and certainly; and it is sometimes, though rarely, possible to extirpate the disease, even when it extends to the articulation, either directly by gouging out the carious part, or by making a perforation through it across the foot, and passing a seton, which may be made the vehicle of suitable applications, such as the red oxide of mercury, the mineral acids, or a saturated solution of the nitrate of mercury. When these means fail, or are abstained from, in despair of their efficiency, amputation of the leg is the ordinary resource, and the same measure is of course considered necessary for similar disease of the ankle-joint. In the case of compound dislocation of the astragalus, with or without fracture of the malleoli, it is deemed proper, in the first instance, to give the patient a chance of retaining his limb: unless his habit of body, or the circumstances in which he is placed, should be unfavorable for his recovery, when prudence is thought to require amputation of the leg.

It thus appears that compound dislocation of the astragalus, and caries of this bone and of its adjoining articulating surfaces, are the principal cases for amputation of the leg, and that consequently this operation may usually be superseded by amputation at the ankle-joint. It may be objected that, when the joint itself is diseased, entire removal of the articulation must be requisite. But in what is commonly called disease of the ankle, the joint between the astragalus and os calcis is affected much more frequently than that between the astragalus and bones of the leg; and even when the latter condition really exists, it would be easy to remove all of the bone that is essential for the recovery, by sawing off a slice from the articulating extremities of the tibia and fibula, as the caries penetrate to no great depth in the cancellated texture.

The advantages promised by amputation at the ankle-joint, instead of the operation near the knee, are: 1. That the risk of life will be smaller; 2. That a more comfortable stump will be afforded; and, 3. That the limb will be more seemly and useful for support and progressive motion.

The risk of life must be less, because the parts removed are not nearly so extensive as when the leg is amputated, hardly exceeding, indeed those concerned in Chopart's operation; because there is less

room for hemorrhage, either immediate or secondary, owing to the smaller size of the vessels cut, which are merely the branches of the posterior tibial, and the anterior tibial artery, very near its termination; and because the cavities of cylindrical bones not being opened, the danger of exfoliation from the dense osseous texture, and of inflammation in the medullary veins, is avoided. The stump will be more comfortable, because it is formed of parts peculiarly well calculated to protect the bone from injury, and not disposed to contract like the muscular tissue; because the cut extremities of the nerves being smaller, will be less apt to enlarge and become the seat of uneasy sensations; and because the absence of exfoliation insures complete union of the integuments over the bone. And the limb will be more useful, as well as seemly, from full play being afforded to the movements of the knee-joint, without the embarrassment of an imperfect stump.

On these grounds, I think amputation of the ankle-joint may be advantageously introduced into the practice of surgery. I regret having cut off many limbs that might have been saved by it, and shall be glad if what has been here said in its favor encourages others to its performance.

In the observations which I lately offered, with the view of recommending disarticulation at the ankle-joint instead of amputation of the leg, it was stated that even in cases where the joint itself was diseased, "it would be easy to remove all of the bone essential for recovery, by sawing off a slice from the articulating extremities of the tibia and fibula, as the caries penetrates to no great depth in the cancellated texture." Soon after this opinion was expressed, I met with an opportunity of testing its accuracy, and am happy to say that the result promises to realize my most sanguine expectations.

Case IV.—Dr. W., a medical gentleman, about twenty-five years of age, after suffering from general rheumatism, was twelve months ago attacked with severe pain in the left ankle, accompanied by swelling and inability of using the limb. Various remedies were used without much benefit. An abscess opened in the course of the summer, and continued to discharge from a sinus between the ankle and heel. Six weeks ago, I saw him with Mr. Goodsir. He was much reduced in strength, and greatly emaciated, obtaining no rest, except through the use of opiates, and evidently sinking under his protracted sufferings.

In these circumstances, amputation appeared to offer the only hope of relief, and even this measure, if carried into effect at the usual part below the knee, threatened no small danger in the patient's weak and irritable state. I proposed disarticulation; and, meeting with no

objection, performed it as described in my former paper. The articulating surfaces of the joint being everywhere divested of cartilage, rough and carious, instead of removing the malleolar projections separately, I exposed the bone sufficiently to saw off both together, with a thin lamina of the tibia connecting them. This was effected with the greatest facility, and left a perfect sound surface. No constitutional disturbance followed—the patient improved in strength as well as appearance, every day after the operation, and the healing process proceeded most satisfactorily. There is now merely a slight watery discharge from the cavity of the flap. This happened in the former case, and required a counter opening for its discharge. But a counter opening has been rendered unnecessary on the present occasion, by an opening through the integuments of the heel, which was found unavoidable in dissecting them from the bone, owing to their thinness and firm adhesion. The drain thus afforded, has proved so useful, by permitting a free escape to the discharge, and allowing the edges of the flaps to unite throughout their whole extent, that I think its intentional establishment would be advantageous.

It may seem a startling, but it is nevertheless a true statement, that amputation at the ankle-joint, with hardly any exceptions, may, and ought to supersede amputation of the leg below the knee. In order to establish this position, it is necessary to show, in the first place, that the stump, which results from the former operation, is fit for the duties required of it; and, secondly, that the patient may, under the various circumstances concerned, be relieved as effectually in the one way as the other.

The idea of amputating at the ankle-joint, is not new, the operation having been performed on the Continent, by different surgeons, before I thought of it; and it would probably ere now have become generally adopted, but for the doubt that was entertained as to the ends of the bones being sufficiently covered to afford the patient a comfortable and useful support for the limb. For my own part, when I read of dissecting flaps of skin from the instep, or sides of the foot, I felt so much distrust in the protection that could thus be effected, against the injurious effects of pressure on a part so exposed to it, that I had no desire to try the experiment. But it occurred to me, that by performing the operation in a different way, all such objections might be obviated. This was to save a flap from the sole of the foot and thick integuments of the heel, by making a transverse incision, and dissecting these parts from the os calcis, so that the dense textures provided by nature for supporting the weight of the body, might be still employed for the same purpose. Two trials of this operation having proved satisfactory, I communicated them to the profession, and am glad to find that not only my colleagues in the hospital here, but also practitioners in

other places, have already acted upon this recommendation. The additional experience of my own practice now enables me to suggest some improvements in the mode of procedure—point out an error to be avoided—and verify the expectation formerly expressed as to amputation of the leg being hardly ever required.

The best instrument for performing the operation, is a large bistoury, or small amputating knife, with a blade about four inches long. There is no occasion for a tourniquet, as the assistant has complete command of the vessels by grasping the ankle. In my first operations, the flap was made unnecessarily long; and I feel confident, that the following directions may be trusted for exactly determining its proper extent. The incisions across the instep and sole of the foot should be curved, with the convexity forward, and exactly opposite each other. A line drawn round the foot, midway between the head of the fifth metatarsal bone and the malleolus externus, will show their extent anteriorly, and they should meet a little way further back, opposite the malleolar projections of the tibia and fibula. Care should be taken to avoid cutting the posterior tibial artery before it divides into the plantar branches, as in two cases where I did so, there was partial sloughing of the flap. If the ankle-joint is sound, the malleolar processes should be removed by cutting-pliers; but if the articulating surfaces of the tibia and fibula be diseased, a thin slice of these bones should be sawn off. The edges of the wound should be stitched together and lightly dressed. When the cure is completed, the stump has a bulbous shape, conical in form on the inferior surface, and having for its apex, or central point of pressure, the thick integument which covered the heel.

In proceeding to consider the circumstances in which this operation may be performed, it seems to be worthy of notice, that, until a recent period, amputation of the leg was in this country generally resorted to for the removal of diseased bone, when the part affected extended upward beyond the metatarsus. The operation of Chopart might frequently have accomplished all that was requisite, but unfortunately suffered from a prejudice which opposed its adoption. This was, that the extensors of the heel, being deprived of antagonizing action, would point the stump downward, so as to render it useless as a support for the body. In 1829, for reasons elsewhere stated,* though there was no precedent for its performance in Edinburgh, I ventured upon this partial amputation of the foot, with perfect success, and without the slightest inconvenience of the kind anticipated. Encouraged by this result, I resolved to adopt the operation: and before long, performed it six times with entire satisfaction. Since that time, the operation

* Edinburgh Medical and Surgical Journal, October 1829.

has been established here, and regularly practiced in cases admitting of its application.

Although the introduction of Chopart's operation considerably abridged the field for amputating the leg, there were still two situations in which caries frequently occurs, where it was beyond the reach of any partial removal of the foot. These were the joint between the astragalus and os calcis, and the ankle-joint itself. In the former of these situations, the diseased bone is so near the fibular side of the heel, that it is apt to seem within reach of the gouge or other means of extirpation; and attempts have often been made to effect this, but seldom, if ever, with success, owing to the caries extending along the complicated articulating surfaces of the bones affected. I have succeeded in such a case by making a fair breach through the foot from side to side, and passing a thick seton, which could be made the vehicle of red precipitate, and other escharotics; but even this treatment cannot be depended upon, and its failure, in a case where I had ventured to indulge hopes of success, led me to think of contriving a method of amputating at the ankle-joint, which might afford relief under such circumstances, and afford the patient a comfortable stump. In the case of John Wood, formerly related,* the disease was thus situated, between the astragalus and os calcis. Soon after that case had terminated favorably, I met with another related in the same paper, where the ankle-joint itself was affected, and did not hesitate to repeat the operation. The gentleman who was the subject of it, though long in very indifferent health from other causes, now walks with ease and comfort.

Compound dislocation of the ankle-joint, either with or without that curious displacement of the astragalus, which results from falling with great force on the heel, was formerly held to require amputation of the leg. The authority of Sir A. Cooper's experience encouraged attempts to preserve the limb in such cases; and in private practice both forms of the injury are now frequently conducted to a successful issue, though in general through a protracted process of recovery. But it must be admitted, that many lives have been lost, especially in hospitals, from trying to retain the limb. In the Royal Infirmary, I find that of thirteen patients who had suffered compound dislocation of the ankle, and were not subjected to amputation, only two recovered; and even in the event of recovery, the foot generally remains in such a state of stiffness, weakness, and sensibility to external impressions, as to be rather an incumbrance than a support to the patient. Now, all this danger, tedious confinement, and permanent discomfort might be obviated by amputating the foot in the first instance. So

* Monthly Journal, February, 1843.

long as the only alternatives were an attempt to preserve the limb, and amputation of the leg, there was a strong inducement to abstain from operating. But if the patient's safety and speedy recovery may be ensured by taking away merely that part of the limb which, in the circumstances, can be of little value either as to use or ornament, while at the same time a stump is produced, in all respects preferable to a shattered, stiff, irritable foot—I think there should be little hesitation in resorting to amputation at the ankle-joint under the circumstances in question. I would certainly have done so in the following case, had I not been in the country on the day of the patient's admission:

Case V.—John Cameron, aged fifty-four, was admitted on the 11th November, having on the morning of that day fallen from a height of about twenty feet into the hollow of a gasometer. There was a large rent in the instep of his right foot, through which the articulating surface of the astragalus protruded. It was replaced without any difficulty, and the edges of the wound were brought together. He did very well for a few days, but then became feverish and complained of pain in the limb, which had become much swelled. Incisions were made with the effect of discharging matter and affording relief. He continued pretty well until the 25th, when he had a rigor followed by increase of fever. On the 31st he had another rigor, and his pulse, which had previously ranged from ninety to a hundred, increased to a hundred and twenty. On the 2d December, as a forlorn hope, I amputated the foot at the ankle-joint. As the malleolus internus was fractured, and the articulating surfaces of the tibia and fibula divested of cartilage, I sawed off a slice of both bones. The patient improved daily after the operation, and though recovery was delayed by the unhealthy state of the leg, in which diffused suppuration repeatedly took place, the stump had cicatrized completely on the 15th January. All who witnessed this case were persuaded that amputation of the leg would have proved fatal if performed at the time the foot was removed.

When the anterior part of the foot is destroyed by violence or exposure to cold, the remaining soft parts may be employed in different ways to afford a covering for the bones. It was for such occasions that Chopart contrived his operation, which, from its proximity to the ankle, has hitherto been considered the last resource, short of amputating the leg. This severe measure would have been deemed necessary in the following case, according to the established rules of practice:

Case VI.—James Sutherland aged twenty-five, from Shetland, was admitted on the 25th of September. He stated that four months

before, in consequence of exposure to cold, his left foot suffered from mortification; nearly the whole of it had separated, so that only the astragalus and os calcis, with the integuments covering them, remained. The anterior articulating surfaces of these bones were quite denuded, and it was evident that the formation of a cicatrix over them was not to be expected through any length of time or attention in treatment. But as the soft parts, though not more than sufficient for the ankle-joint amputation, seemed adequate for the purpose, I resolved to attempt the patient's relief in this way.

I performed the operation on the 3d October, taking away no part of the integument except what was requisite to give the flaps a proper form. The wound healed by the first intention, and before the end of the fourth week the patient was able to walk through the wards with a common shoe, so that the defect of his limb could hardly be noticed.

In describing the operation, I have said that care must be taken to avoid cutting the posterior tibial artery before it divides into the plantar branches; and I may now explain more particularly the ground on which this advice is founded.

Case VII.—Elizabeth Wilson, aged seven, from Dalkeith, recommended by Dr. Hunter, was admitted on the 19th of February, on account of disease in her left ankle. It had become swelled and painful about sixteen months before, without any known reason. Matter speedily formed, and was discharged spontaneously by several openings, which did not afterward heal. The foot was much enlarged, stiff, and shapeless; and two sinuses allowed a probe to pass into carious bone.

On the 21st, I proceeded to amputate at the ankle-joint, but finding that anchylosis had taken place between the articulating surfaces, I exposed the extremities of the tibia and fibula, and sawed them through, without previously removing the foot as usual. In tying the vessels, it appeared that the posterior tibial artery had been divided before its division into the plantar branches, so that one ligature sufficed in place of two. The stump looked remarkably well, and the result of the operation was expected to prove very favorable. It was, therefore, with much surprise, and no small disappointment, that, in the course of a few days, I saw the flap had sloughed through fully a half of its extent. Recovery was consequently delayed much beyond the ordinary period, and the patient did not leave the hospital until the 31st of March. The stump at length cicatrized by contraction of the integuments, and, though not so full and cushion-like as usual, became perfectly serviceable and comfortable.

I attributed the sloughing in this case to the undue pressure of a bandage; and having occasion soon afterward to perform the operation on a

patient in Minto House, intentionally divided the posterior tibial before its division, in order to obtain the same facility in tying the vessel as on the last occasion. To my surprise and concern, the flap again sloughed to the same extent as in the case just related, and as great attention had been paid to dressing the stump, I could not refer this effect to the cause formerly supposed. But as, on both occasions, the artery had been cut before its division, while in all the other cases it had been left entire, and as the flap, being deprived of nourishment from most of its ordinary sources, must be supplied with blood only through the successive anastomoses of small vessels, I concluded that this deviation from usual practice had led to the mischief in question, and I resolved to avoid it for the future.

Case VIII.—Robert Craig, aged ten, from Dunbar, recommended by Mr. Turnbull, was admitted on the 3d of June, on account of disease in his right foot. It was stated that three months before, after severe rigors, inflammation had commenced, and been speedily followed by the formation of matter. A succession of abscesses then formed, and gave rise to a number of sinuses opening in different parts of the instep and sides of the foot, and allowing a probe to enter carious bone. The general health had latterly been much impaired.

I amputated the foot on the 5th, taking care to avoid cutting the posterior tibial artery. The wound healed chiefly by the first intention, and the boy is already almost quite well.

It has now been ascertained that amputation at the ankle-joint may be performed so as to afford a stump, in every respect, convenient and comfortable, retain the full use of the knee-joint, and enable the patient to walk with perfect freedom. It has also been shown that by means of this operation caries of the upper range of the tarsus, of the joint between the os calcis and astragalus, and of the ankle-joint itself, may be removed; while compound dislocation of the ankle, and destruction of the foot beyond the extent admitting of Chopart's operation, may also be remedied by it. But what other occasion beside these is there for amputating the leg? Malignant tumors of the tibia and fibula require amputation of the thigh, and compound fractures of the leg, so severe as to demand removal of the limb, hardly admit of the operation being performed below the knee, on account of the soft parts so near the seat of injury being unfit for healing action. The cases, therefore, requiring this operation, must be very few. In my own practice, since adopting amputation at the ankle-joint, I have removed only one leg below the knee, under very peculiar circumstances, which did not permit the milder measure to be adopted.

In conclusion, it may be remarked, that the advantages of amputation at the ankle-joint, as compared with amputation of the leg, are

not limited to the smaller degree of mutilation, and greater utility of the limb; since the operation is also attended with much less danger. This will appear when it is considered: 1. How much less the shock must be, from the small extent of parts removed, which is little more than in Chopart's partial section of the foot. 2. That the smallness of the arteries divided prevents any risk of serious hemorrhage. 3. That, from its cancellated texture, the bone exposed is not liable to exfoliate. 4. That from the medullary canal remaining entire, inflammation of its contents, and also of the veins, is prevented.

In confirmation of these grounds for favorable expectations as to the diminution of danger, I am now able to add the proof of experience, since in fourteen cases where the operation has been performed, eight in my own practice, and six in that of others, there have not occurred any fatal results.

In former communications, I have endeavored to establish the general utility of amputation at the ankle, by showing the successful application of this operation to the relief of different morbid conditions, for which removal of the leg has been hitherto thought necessary. Caries of the astragalus and os calcis, and of the ankle-joint itself, destruction of the whole foot, except the heel, through exposure to cold, and compound dislocation of the astragalus, by the effects of external violence, threatening to prove fatal by continued suppuration, have all been remedied in this way. With the same view, I will now relate two cases of a different kind, which have lately occurred.

Case IX.—I was asked by Dr. Charles Bell to see this little patient. At the time of birth there was a considerable growth of the erectile character occupying the anterior part of the foot, which did not enlarge much during the first two or three months, but afterward increased very rapidly, so as at length to destroy all trace of the ordinary form, and convert the foot into an unshapely tumor, of a purple color. As the integuments of the heel remained sound, it seemed practicable to remove the disease by disarticulation at the ankle-joint. And as a very slight extension of the swelling, by preventing this measure, would have left no alternative but amputation of the leg, I advised against further delay, notwithstanding the want of any precedent for performing so serious an operation at an age so early.

On the 15th of January, I removed the foot in the usual manner, with exception of not taking away the malleolar processes. The child did not suffer the slightest constitutional disturbance; and the wound healed almost entirely by the first intention. Mr. Goodsir has given me the following account of the tumor:

"A fine injection of size and vermilion having been thrown into

the arteries of the foot, the skin assumed a red tint, except where it was so attenuated as to display the peculiar bluish color of the subjacent diseased mass.

"It was then cut longitudinally into two portions. A gush of venous blood reduced its size very considerably. By means of a gentle stream of water, the rest of the contained blood was washed out, all pressure being avoided.

"The two halves were then laid in a basin of spirit, and by means of a syringe, that fluid was forced into the diseased mass, so as to distend the whole almost to its original size.

"After having been hardened, fresh longitudinal sections were made, avoiding all pressure, and the structure was examined.

"The venæ saphenæ, plantar and posterior tibial veins are much enlarged, and have undergone a peculiar change, which consists of increased bulk of the fibrous fasciculi of their coats; and of longitudinal and oblique foldings of the parietes, due, partly to the fasciculation, partly to actual involution.

"About the center of the foot, the veins break up into the general cellular arrangement which constitutes the disease; the saphenæ forming a sort of central cavity on the dorsum; the plantar a much larger cavity or central areola in the sole of the foot.

"The diseased mass itself consists of areolæ which decrease in size, from the central venous cavities to the surface of the skin, and to the deep limits of the disease: these limits being defined by the internal membrane of the venous system, which is continuous through all the areolæ.

"The diseased mass has not displaced the surrounding textures, but has caused them to disappear before it, as in certain malignant growths and ulcerations—bone, ligament, muscle, and fat, having equally failed in resisting its progress, the skin alone standing out against its advance, and along with the venous membrane forming the limit of its superficial portion.

"The areolæ of which the mass consists are elongated from the central cavities toward the limits of the disease, being more elongated the nearer they are to the centers. The peculiar form of the areolæ is due to the radiated direction of the bars, and imperfect laminæ which separate them, these being thicker, stronger, more elongated, and more separated from one another around the central cavities, than near the circumference, where they are shorter, finer, and much more numerous.

"The bars and imperfect laminæ consist of fibrous texture exactly resembling that of the tendinous ligaments, and aponeuroses, with numerous germinal centers.

"The bars and laminæ are all covered, and consequently the con-

tained areolæ lined by a fine membrane consists of tesselated epithelium, and continuous with the lining membrane of the venous system, at the central cavities, or diseased terminations of the saphenæ and plantar veins.

"In many of the bars and laminæ, small arteries are situated, and one of these was traced nearly to the termination of the anterior tibial on the back of the foot. It was not ascertained how the arteries terminated, but it was presumed that they passed by small oblique orifices into the venous areolæ, as the curling arteries of the human placenta pass into the venous areolæ of the decidua."

Case X.—Thomas Niven, aged thirty-six, fourteen years ago, fell into a coal-pit, and, alighting on the heel of his left foot, sustained a great shock of the whole limb. It ever afterward felt weak and impaired in sensibility, and also became thinner than the other one. But his principal complaint was a sore on the heel, which allowed a probe to pass into the substance of the bone, and on this account he was admitted into the hospital three years after the injury, when, thinking that the limb might recover its vigor in time, if relieved from the local imperfection, I exposed the tuberosity of the os calcis, and sawed off all the part of it which seemed to be diseased. The wound healed, and he was dismissed with the prospect of being soon quite well.

He returned the 15th of August last, complaining of a sore in the old situation still exposing the bone, and also of another confined to the integument over the trochanter major, which had given him little trouble, while the former rendered him quite unable to work, or make any exertion for his support. In other respects the limb remained as has been already mentioned, and excited some apprehension that even the complete removal of the local disease would not afford relief. But as the patient was extremely anxious to have anything done that promised a chance of benefit, I resolved to amputate the foot.

I performed the operation on the 19th of August, carefully preserving the integuments that remained sound on each side of the heel, so as to compensate for the great loss of substance in the side of the foot, and thus formed two lateral flaps, which met together very well over the ends of the bones, after the malleolar processes, with a thin connecting slice of the tibia, had been sawed off. The wound healed soundly, without trouble or delay; the sore near the hip also cicatrized; and the patient was dismissed on the 27th of September.

The two following cases do not present any features materially different from those which have been noticed in former communications, and may therefore be merely mentioned as confirming what has been already stated with regard to the success attending amputation at the

ankle for caries—the morbid condition most frequently requiring the operation, and for which, I regret to learn that amputation of the leg is still in use. Prejudice, and established habit, are doubtless great obstacles to improvement, but should not be permitted to maintain what has been proved to be an unnecessary mutilation.

Case XI.—Peter Anderson, aged twenty-two, from Forfarshire, was admitted on the 17th of December last, on account of a disease in his foot, which had existed for fifteen months, in consequence of falling from a height upon the heel, and for twelve months had prevented him from following his employment as a mill-wright. I amputated the foot at the ankle, on the 15th of January, and he was dismissed with an excellent stump on the 27th of March.

Case XII.—John Christie, aged fourteen, from Fife, was admitted on the 21st of January, on account of an extensive disease in the bones of his foot, which had existed two years. I amputated the foot at the ankle on the 5th of February, and the patient was dismissed with an excellent stump on the 30th of March.

In the number of this journal * for last month, I find the following passage, extracted from a foreign medical periodical:

"A tibio-tarsal amputation was performed some years ago, on a young soldier, by Dr. Baudens. The patient could walk very well for a year afterward with an ordinary shoe, attached by two metallic splints. He walked considerable distances in this manner without fatigue, ascended and descended stairs easily, danced and leaped with agility. This patient afterward entered the hospital wards of the Hotel des Invalides, where he has remained several months. His stump became excessively painful; the cicatrix reopened, and ulcerated in many places. Two abscesses, which formed in the tissue of the cicatrix, were opened a few days ago by M. Hutin, and it is probable that the subjacent bones were diseased. The patient experiences great suffering, and eagerly demands another amputation near the knee.

"This case gives rise to certain questions, of which our readers have to demand an account. First, we must remark, that the indifference with which civil and military surgeons have received the memoir of M. Baudens, is no proof of the non-value of the operation, for it has been performed by Mr. Syme, of Edinburgh, a dozen times, with perfect success. It is true, however, that Mr. Syme has generally operated on children, and that he has only published the immediate results of the operation. Now the question is, what are the remote

* Monthly Journal of Med. Science.

consequences? since, in the case of M. Baudens, the cicatrix did not inflame, ulcerate, or reopen, for more than a year after the operation. It becomes the more important to know the actual state of Mr. Syme's cases, as it might enable us to decide, whether the bad condition of the cicatrix in the patient now at Les Invalides, depends on a constitutional disease (as we presume is the case), or on the form of the flaps, or of the stump. We should remember, however, that in the operation of M. Baudens, the head of the malleolus was sawn through after the disarticulation, while Mr. Syme preserves the malleolus intact. We must say, that until new facts enlighten us on the subject, and notwithstanding the great aversion that the civil and military surgeons of Paris experience in adopting the tibio-tarsal operation, we persist in believing it advantageous in many cases. We amputate at the articulation of the wrist, why then hesitate at the same point in the inferior extremity?"*

With reference to this statement, I beg to mention, 1. That I have operated in more nearly two than one dozen of cases, with perfect success; 2. That most of the patients have been adults; 3. That I have in no instance, except that of the infant, "preserved the malleolus intact;" and have always removed the whole articulating surface, except once or twice, when I detached the malleolar processes by means of cutting-pliers; having on all other occassions sawn off a thin slice from the tibia, connecting the projections of bone at each side; and, 4. That the following letters relative to the two cases, which were first subjected to the operation, and gave rise to my original papers, will, I hope, be considered satisfactory evidence as to the "remote consequences." In the first of these cases, the disease being seated between the astragalus and os calcis, only the malleolar parts of the articular surface of the ankle were removed. In the second, as the ankle-joint itself was extensively carious, the whole articulating surface was removed by the saw.

As to the mode of performing the operation, I have nothing to say in addition to what has been already stated, except that I find a flap sufficiently large for the purpose, is obtained by cutting from the center of one malleolus to that of the other, right across the sole of the foot; the dissection from the os calcis is thus facilitated, and the risk of sloughing lessened, if not entirely prevented.

From Thomas Aitchison, Esq., Surgeon, Dunbar, to Mr. Syme.

DUNBAR, *June* 4, 1846.

MY DEAR SIR—It gave me much pleasure to hear, by yours of the 2d instant, that the boy Fargie's case is likely to terminate so satisfactorily.

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* Annales de Thérapeutiques, Mars, 1846.

I sent for the boy Wood, whose life was spared by a similar operation, executed by you two or three years ago (September, aged sixteen). I examined most carefully the *stump*, which was all sound. He had had a renewal of the false foot since he had seen you. He told me he suffered no inconvenience from the stump, or the slightest tenderness. He has become a country tailor, and has often ten and fifteen miles a-day to go to his work; still he feels no *discomfort*. He says he, with a few of his young comrades, ran off to see the operations of the North British Railway, at Penmanshiel Tunnel, and must have walked fully thirty to thirty-five miles, without feeling his amputated limb.

You may rely upon it, nothing can be more satisfactory than this case of the boy Wood; and if Fargie's and all similar cases prove, under your hands, as successful, amputation at the ankle-joint, and its effects, will prove the greatest blessing to the human race, especially those unfortunates so afflicted.

I am, my dear sir, yours, most faithfully,

THOS. AITCHISON.

The young man Fargie, alluded to by Mr. Aitchison, had suffered from caries of the tarsus for fourteen years. He had the foot amputated, and left the hospital, restored to health, and with a sound stump, six weeks after the operation.

Dr. —— to Mr. Syme.

EDINBURGH, *June* 9, 1846.

DEAR SIR—You will remember that I lost my foot in January. The stump healed rapidly, and in six weeks had all closed, except one small aperture, from which a slight watery discharge continued to come till the month of June, when it suddenly ceased, and complete cicatrization occurred. Since that period, I have experienced no pain or uneasy sensation of any kind in the stump, nor any tenderness, making standing or walking irksome, or unpleasant. I have very rarely experienced the feeling of the lost foot being still part of the body, and the seat of pain, which is so common a complaint among those who have been deprived of limbs. For the last two years, I am not aware that I have known this sensation at all; if I have, it has made no impression on my memory. I can lean the weight of my body on the naked stump without inconvenience; and, with a single stocking over it, am in the habit of walking through the house, when my boot is not at hand.

The artificial foot I wear, within an ordinary half boot, is made of light wood, with a spring across the part corresponding to the roots of the toes. This spring, however, is of no use, as the rigidity of the boot inclosing it prevents its acting. The foot might as well be made

of one piece of wood. At the heel it is hollowed into a concavity, corresponding to the shape of the stump, but rising up before and behind into two prolongations, which, seen in section, would resemble the horns of a crescent. The foot is cased in chamois leather, which is carried up from the borders of the concavity, and cut into the shape of the upper part of a lady's cloth boot. Like it, also, it is laced up the inner side, and has a tongue; the latter is made of thick soft leather, and is of much service in securing the fitting of the foot. There are no straps or buckles, or steel supports of any kind, nor are they needed. From the bulbous form of the stump, and its circumference being considerably greater than that of the leg above it, the lacing of the upper leather completely suffices to hold the artificial foot on. It would be impossible, indeed, to pull it off without loosening the lace, or tearing the leather.

The artificial foot, as originally furnished, was thickly padded; but I found the padding so apt to shift, and so liable to become uncomfortable from saturation with moisture, that I had it all removed. It is much more convenient to pad the stump, by covering it with two or more worsted or shamois leather stockings, which can be changed at pleasure. I use a stick in walking; but, except on rough causeways, or very uneven ground, it is unnecessary; neither is it requisite in ascending or descending stairs.

The results of an inflammatory attack of the lungs make me a bad walker, nor have I ever ascertained how long a pedestrian journey I could achieve; but I have stood for six hours (not consecutively) daily, for months together, without any inconvenience, and I wear the artificial foot, without intermission, from morning till bed-time.

Very sincerely, —— ——

Soon after this I was asked by Dr. Shand, of Kirkcudbright, to see a gentleman in his neighborhood who suffered from caries of the foot, complicated with great disorder and depravation of the general health. I proposed amputation at the ankle as attended with less danger than removal of the leg, and performed it with success. Thus acquiring increased confidence in the opperation, I employed it in a great variety of cases, of which may be mentioned, an erectile tumor of the foot in an infant six months of age, a malignant growth of the foot, compound fracture of the ankle, and caries in all the situations which, being beyond the reach of Chopart's operation, are usually held to require amputation of the leg. The results being still uniformly and entirely favorable, I considered it my duty to impress upon the profession the propriety of adopting this operation; and notwithstanding the opposition which all innovations upon established practice are apt to experience, I have now the satisfaction of knowing that, both at home

and abroad, amputation at the ankle is already in general use. Dr. Shuh, the distinguished professor of surgery of Vienna, who lately honored Edinburgh with a visit, expressed his belief that it was now performed in every town of Germany.

When the operation is to be performed, pressure should be made on the tibial arteries by the finger of an assistant, or a tourniquet applied above the ankle. The only instruments required are a knife, of which the blade should not exceed four inches in length, and a saw. The foot being held at a right angle to the leg, the point of a knife is introduced immediately below the malleolar projection of the fibula, rather nearer its posterior than anterior edge, and then carried straight across the bone to the inner side of the ankle, where it terminates at the point *exactly opposite* its commencement. The extremities of the incision thus formed are then joined by another passing in front of the joint.

The operator next proceeds to detach the flap from the bone, and for this purpose, having placed the fingers of his left hand over the prominence of the *os calcis*, and inserted the point of his thumb between the edges of the plantar incision, guides the knife between the bone and nail of the thumb, taking great care to cut parallel with the bone, and to avoid scoring or laceration of the integuments. He then opens the joint in front, carries his knife outward and downward on each side of the astragalus, so as to divide the lateral ligaments, and thus completes the disarticulation. Lastly, the knife is carried round the extremities of the tibia and fibula, so as to afford room for applying the saw, by means of which the articular projections are removed, together with the thin connecting slice of bone, covered by cartilage. The vessels being then tied, and the edges of the wound stitched together, a piece of wet lint is applied lightly over the stump, without any bandage, so as to avoid the risk of undue pressure in the event of the cavity becoming distended with blood, which would be apt to occasion sloughing of the flap. When recovery is completed, the stump has a bulbous form, from the thick cushion of dense textures that cover the heel, and readily admits of being fitted with a boot.

The advantages which I originally anticipated from this operation were: 1. The formation of a more useful support for the body than could be obtained from any form of amputation of the leg; and, 2. The diminution of risk to the patient's life, from the smaller amount of mutilation, the cutting of the arterial branches instead of trunks, the leaving entire the medullary hollow and membrane, and the exposure of cancellated bone, which is not liable to exfoliate like the dense osseous substance of the shaft. From my own experience, amounting to upward of fifty cases, and that of many other practi-

tioners who have adopted amputation at the ankle, I now feel warranted to state that these favorable expectations have been fully realized, and that, in addition to its other advantages, this operation may be regarded as almost entirely free from danger to life.

The objections which have been alleged against the operation are, its extreme difficulty, and the risk of the flap sloughing. But, with all deference to the authors of these allegations, I do not hesitate to say, that, in so far as well founded, they should be attributed to the operator, and not to the operation. In the Royal Infirmary of Edinburgh, this disarticulation is completed without the slighest hurry, in less than a minute, and if the flap is not scored or lacerated, or made too long, there is no chance of its sloughing.

Though at the expense of some repetition and want of arrangement, I have given these different notices of amputation at the ankle as they originally appeared, instead of digesting them into a more methodical form, that the reader may see how I was led to adopt and place confidence in the operation.

The favorable anticipations which my first trials led me to entertain, have been more than realized, and I am happy to find that the prejudice, which is always opposed to any alteration of established practice, is rapidly giving way to the force of conviction, founded on experience. In many metropolitan and provincial hospitals of all the three kingdoms, and frequently also in private practice, amputation at the ankle has been practiced with the most satisfactory effect. On the Continent this operation has met with a not less favorable reception, and is especially indebted to the testimony so honorably bestowed on it in the distinguished school of Heidelberg, where Dr. Chelius, Jr., has made amputation at the ankle the subject of his practical dissertation,* and dedicated it to me, in expression of his satisfaction with what he had seen done in Edinburgh, and successfully repeated in the hospital of his respected father.

Little further remains to be said upon the subject, and the only point which seems to require any notice, regards the proper extent of the flap, together with the mode of detaching it, as it is this part of the process that seems to constitute the only stumbling-block in the way of its general adoption. Indeed, the difficulty attending the dissection of a flap from the heel, has been found so great by some operators, as to induce them to try other modes of obtaining a covering for the bones, while the dread of mortification has suggested to others the formation of lateral flaps. Now it is certainly very desirable that the thick integuments of the heel should be preserved entire, to form a cushion for the stump; and I am quite sure that the operation for

* De Amputatione in Articulo Pedis. Heidelberg, 1846.

accomplishing this, admits of being performed so as to avoid any mechanical difficulty which may not be readily surmounted, and also any risk of sloughing.

In my earlier operations, I made the flap unnecessarily long, and in consequence suffered two inconveniences, in the first place, from difficulty in executing the dissection; and secondly, from the occurrence of sloughing in the event of the posterior tibial artery being divided above its division into the plantar branches. Succeeding experience taught me that a much smaller extent of flap than had originally been considered necessary was sufficient for the purpose, and that hence the operation could not only be simplified in performance, but increased in safety from bad effects.

I am now able to state precisely the limits of incision which will be found to render the practice no less easy than secure.

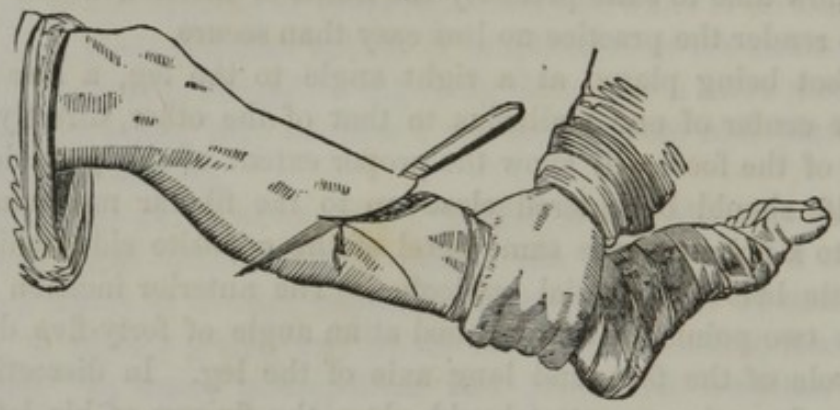
The foot being placed at a right angle to the leg, a line drawn from the center of one malleolus to that of the other, directly across the sole of the foot, will show the proper extent of the posterior flap. The knife should be entered close up to the fibular malleolus, and carried to a point on the same level of the opposite side, which will be a little below the tibial malleolus. The anterior incision should join the two points just mentioned at an angle of forty-five degrees, to the sole of the foot, and long axis of the leg. In dissecting the posterior flap, the operator should place the fingers of his left hand upon the heel, while the thumb rests upon the edge of the integuments, and then cut between the nail of the thumb and tuberosity of the os calcis, so as to avoid lacerating the soft parts which he, at the same time, gently but steadily presses back until he exposes and divides the tendo Achillis. The foot should be disarticulated before the malleolar projections are removed, which it is always proper to do, and which may be most easily effected by passing a knife round the exposed extremities of the bones, and then sawing off a thin slice of the tibia connecting the two processes.

THE LEG.

In amputating the Leg, it would serve no good purpose to preserve more than the half of its length, since a stump of this extent is quite sufficient for retaining the use of the knee-joint; and if the operation were performed lower, it would be hardly possible to provide a good covering for the bones. A tourniquet having been applied to the popliteal artery, the knife should be introduced close to the edge of the fibula, and pushed directly through the limb, so as to make its exit at the same distance from the fibular edge of the tibia as its entrance, which will leave about a third of the circumference of the leg for the breadth of the flap, and then carried downward, gradually approaching

the surface, so as to form a smooth convex-edged flap, somewhat longer than it is broad. A cut should then be made transversely between the upper two extremities of the first one, and slightly curved, so as to form the edge of the integuments suitably for uniting with that of the flap. The inter-osseous parts being next cut, the saw is to be applied with light, but steady strokes, so as to cut through the fibula, before it divides the tibia; the arteries are then to be tied, and the flap stitched into its place. It is a good precaution to remove the projecting corner of the tibia, which would be apt to irritate the soft parts during the cure, either by means of the cutting-pliers, or by sawing a little obliquely before making the transverse section of the bone.

Fig. 25.



When it is necessary to amputate the leg higher than the middle, the operation by circular incision is less objectionable, while that by flap is not so advantageous as in the lower part of the limb, since, by the former method, it is here possible to obtain an ample covering of integuments for the bone, and a muscular cushion is not so much required, the patient in this case resting his weight on the knee, not on the face of the stump. The flap mode is still, however, preferable, on account of its dispatch, being less painful, and leaving the parts in a favorable state for uniting. If any circumstance ever render it necessary to operate by the other method, a circular incision should be made through the integuments, about three inches below where it is proposed to divide the bones. An assistant then grasping the leg with both hands, pulls the skin upward, while the surgeon, by some slight touches of the knife, detaches its connections with the fascia. The muscles having been exposed to the extent of rather more than an inch, should be cut through by a strong steady sawing motion of the knife, and then a piece of cloth or leather, split longitudinally into three portions, being introduced to retract the parts between and on both sides of the bones, the saw is to be applied, as has been already explained. The edges of the integuments should be brought together laterally, so as to form a vertical cicatrix.

The tibia cannot be cut higher than its tuberosity, and the head of the fibula should never be disarticulated, as the insertion of the *biceps* is thus detached, and a risk encountered of exciting inflammation in the joint, by opening bursæ connected with it.

The circumstances which were formerly held to require removal of the leg, so generally admit of relief through amputation at the ankle, that the former operation is now rarely necessary in practice. Indeed, I have of late years performed it chiefly for the remedy of useless or uncomfortable stumps, resulting from amputation by flap at the middle or higher part of the leg. There can be no doubt that, in these situations, the flap method is very apt to leave a mass of redundant matter, affording no protection to the bone, which, having nothing to cover it, except an imperfect cicatrix, is a perpetual source of discomfort and suffering. In order to prevent the risk of such unpleasant occurrences, and also to afford relief from them when they have unfortunately taken place, I think amputation of the leg should always be performed on the following principles:

In the first place, it does not seem desirable for any useful purpose to retain a longer stump than when the tibia is divided at the distance of an inch below the tuberosity; and as the cancellated texture of this part is less prone to exfoliation than the dense substance of the shaft, it is, therefore, improper to operate lower in the limb. Secondly, since a covering of muscle is not essential to the formation of a good stump, as may be seen from the results of amputation at the ankle, and since the attempt to retain a muscular cushion below the knee is, as has just been mentioned, apt to leave the bone in an exposed state, the operation should be so conducted as to make sure of obtaining a sufficient protection from the integuments. On the whole, I believe from ample experience, that the following mode of procedure, founded upon these principles, is the most eligible that can be adopted.

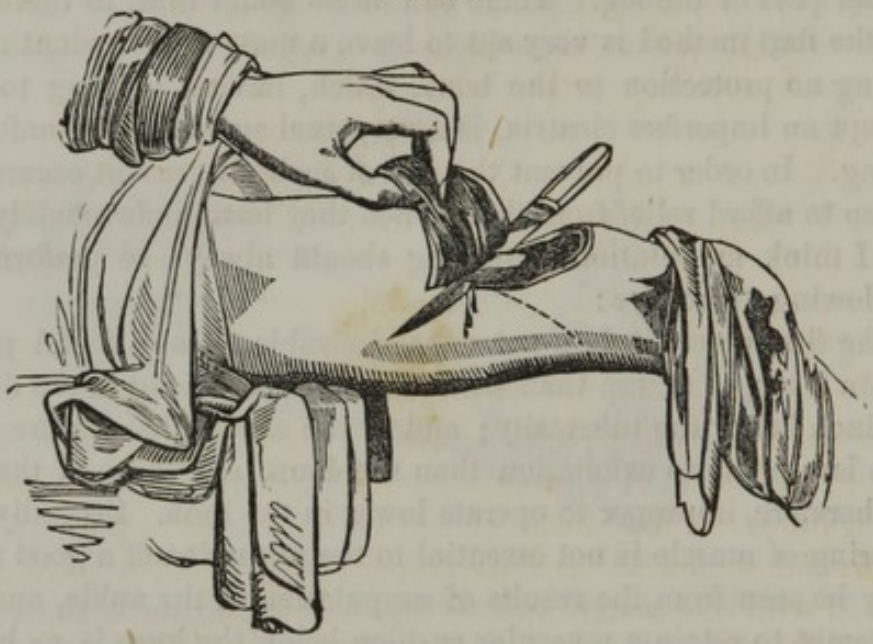
A tourniquet having been applied above the knee, two semilunar incisions are to be made through the skin, from side to side of the limb, with their convexities downward, and their extremities meeting about two inches below the tuberosity of the tibia. The flaps thus formed are then to be detached from their subjacent connections, so as to expose the bones at the distance of an inch below the tuberosity. The muscles are next divided behind, about the middle of the extent to which their surface has been exposed, and then before the interosseous ligament on a level with the line where the saw is to be applied. Allowance having thus been made for the unequal retraction of the anterior and posterior muscles, the surface of the flesh and bone presented after the operation is perfectly even, and admits of being covered by the flaps of integument without either straining or redundance.

The stump thus formed may either be rested on the skin, or employed so as to retain the use of the joint, by means of an apparatus consisting of a hollow cone, secured by straps buckled round the knee.

THE THIGH.

Amputation of the thigh ought always to be performed by making flaps; they should be two in number, and may be lateral, anterior, and posterior, or oblique. The state of the limb must, to a certain

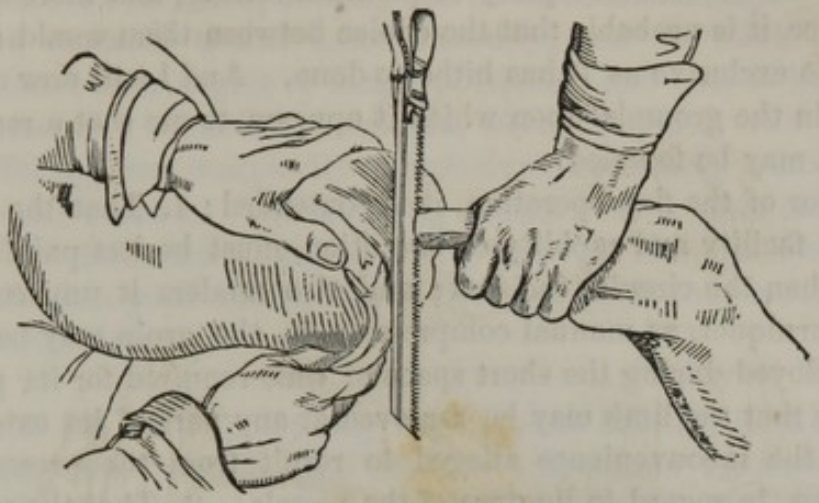
Fig. 26.



extent, determine the choice of these modes; but wherever it is practicable, the second ought to be preferred—since the flaps, when made from before and behind, are least apt to suffer displacement in regard to the bone—and, on the whole, are found to prove most convenient. The limb should never be removed lower than the middle, no advantage being derived from saving a larger stump than the one so obtained; while it appears, whether from the larger size of the bone as it approaches the knee, or the greater contraction of the muscles when cut low, that there is then more risk of an imperfect cure. The femoral artery should be subjected to manual compression in the groin, as the tourniquet might, in this case, be in the way of the knife or saw, and also prevent the muscles from retracting so much at the time as they would do afterward. The surgeon, standing with his left hand toward the limb to be removed, should grasp the soft parts on the fore part of the thigh, so as to draw them as much as possible forward, next pass the knife from side to side, grazing, or rather guided close past the surface of the bone, and then cut obliquely outward, so as to form a large flap extending nearly to the patella. The posterior flap having been completed, the bone is denuded by forcible retraction of

the soft parts by an assistant, while the knife, by repeated circular touches, divides every fiber that might oppose its free exposure; and, lastly, the bone being firmly held in the left hand, the saw is applied equally and steadily close to the retracted muscles. In tying the arteries after this and all amputations performed in the same mode, it is

Fig. 27.



necessary to use great circumspection, as they are apt to be divided obliquely, and therefore may have their orifices only partially included in the ligature. A few stiches should be introduced to keep the sides of the wound somewhat in their proper position, and a piece of lint, moistened with cold water, applied over the stump until the evening after the operation, when straps of isinglass or adhesive plaster ought to be employed to effect accurate coaptation of the edges. During recovery it is necessary to maintain moderate compression with a bandage, to prevent the soft parts withdrawing themselves from the bone. Moist lint covered with oiled silk is the best dressing, and the stiches need not be cut out until the union is nearly completed.

Previously to 1822, amputation of the thigh had always been performed in Edinburgh by circular incision. Having in that year found the operation by flap regularly taught in Paris as a substitute for the ordinary method—and having witnessed its performance in the practice of Mr. Liston—I wrote a paper with the view of recommending this plan, and for many years afterward inculcated it in my lectures as, on all occasions, preferable to the other.* In the Royal Infirmary, where all the attending surgeons have been the pupils of Mr. Liston or myself, the circular operation was completely abandoned; and the influence of this example, together with the written as well as oral instruction connected with it, has produced the effects that might be expected here and elsewhere.

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* Edinburgh Medical and Surgical Journal, 1823, p. 152.

Notwithstanding the share I thus took in introducing the flap operation, and the confident persuasion of its superiority formerly entertained, I have long felt occasion to point out some serious inconveniences apt to attend its performance; and I am now satisfied that there are circumstances in which the circular incision ought to be preferred. If the relative merits of the two methods in question had been discussed with less party or personal feeling, and more practical experience, it is probable that the choice between them would not have proved so exclusive as it has hitherto done. And I will now endeavor to explain the grounds upon which it appears to me that a reasonable selection may be founded.

In favor of the flap operation, it is contended: 1. That the process, from its facility and rapidity of execution, must be less painful to the patient than the circular incision; and also renders it unnecessary to use a tourniquet, as manual compression in the groin may be effectually employed during the short space of time required for its performance; so that the limb may be removed at any part of its extent, and without the inconvenience alleged to result from the pressure of a tourniquet, in regard to ligature of the vessels. 2. That the soft parts may be readily fashioned, so as to afford an ample covering of muscle and integument of bone. And 3. That the different textures of the stump, being allowed to preserve their natural connections, are more capable of sound union, than when detached from each other by dissection and retraction. In objection to this method it is said: 1. That the rapidity of execution is apt to prove hurtful in subjects of defective strength, by producing a shock similar to that of a gun-shot wound. 2. That the vessels, being cut obliquely, are secured with difficulty. 3. That the wound is of greater extent than the surface resulting from circular incision. And 4. That though the flaps afford an ample covering for the bone in the first instance, the contraction of their muscular substance gradually withdraws them from it, during the process of healing, so that there is ultimately nothing more than skin, and frequently not even this, to protect the osseous surface. The grounds upon which the circular operation is maintained, are: 1. The greater facility which it affords to ligature of the vessels. 2. The smaller size of wound resulting from it. And 3. The more permanent covering which it affords to the bone.

In subjecting these various arguments on both sides of the question to the test of experience, it may be remarked, that they are not all of equal value; some of them relating to matter of mere convenience, while others regard consequences of the most serious nature. The great questions at issue are: Which operation least endangers the patient's life? and, Which affords the most comfortable stump? Now, every one who has witnessed the flap operation performed extensively and

indiscriminately for amputation of the thigh, must have seen a large proportion of deaths, and in the event of recovery, not unfrequently a condition of the stump no less unseemly than inconvenient. Such are the undeniable facts, and their explanation presents little difficulty to any one who has had sufficient opportunity of observation.

So far as the mere performance, or early consequences of the flap operation are concerned, nothing can be more satisfactory. The incisions are executed almost instantaneously, and the whole process is completed with a degree of facility, dispatch, and ease to the patient, that presents a remarkable contrast, when compared with the delay and suffering, from complexity of procedure, necessarily attendant upon the circular method. The following extract from a letter addressed to me by Mr. Robertson, surgeon of the Convict Hospital Ship, Sheerness, affords a good illustration of the impression thus made upon an unprejudiced mind.

"*August* 18, 1824.

"Dear Sir—An opportunity having been afforded in this hospital of putting into execution the mode of amputation recommended by you in the seventy-eighth number of the Edinburgh Medical and Surgical Journal, I determined on adopting it. My patient, a lad of sixteen, laboring under an enlargement of the bones of the knee-joint, which had resisted repeated local bleeding by leeches and cupping, issues, blisters, embrocations, and moxa, together with several courses of alterative medicine, submitted to the operation on the 2d instant. My assistant, Mr. Bayley, having undertaken to command the femoral artery, by pressure with his thumb, I followed your directions in every particular, employing neither tourniquet, tenaculum, nor retractor; and, in comparison with the former mode of amputation, this was the work of a moment, with a great diminution of pain, little or no hemorrhage, and with a surface that enables every vessel to be seen on the instant. * * * * * * *

A convict, on whom I had amputated some time ago, stole unnoticed into the ward, and witnessed this operation. He was so struck with the rapidity of the process, and the diminution of pain to the sufferer, that he stopped me on deck to express his surprise at the *unnecessary* pain to which he had been subjected! I quieted his vexation, by telling him, that this mode was not then known. I am, dear sir, etc.,

"Archibald Robertson."*

When the flaps are placed together, it seems as if nothing could prevent their perfect union, so as to effect a speedy cure, and afford a comfortable covering to the bone. In some cases, these favorable

* Edinburgh Medical and Surgical Journal, 1824, p. 437.

anticipations are fully realized; but though a good many days, and even one or two weeks may elapse, without making manifest the disappointment to be experienced, it much more frequently happens that the soft parts, however ample they may have appeared in the first instance, gradually contract and diminish until care is required to keep their edges in opposition over the bone, which sometimes, notwithstanding every precaution, at length becomes denuded, and presenting itself to view, whether dead or living, proclaims the unavoidable misery of a sugar-loaf stump. This distressing result depends upon the vital contractility of the muscular tissue, which continuing in operation so long as the cut surface is not prevented from yielding, by the formation of new adhesions, not only lessens the mass of flesh provided for covering the bone, but gradually retracts it together with the superjacent integuments. The effect thus produced, is favored by the following circumstances: In the first place, by cutting the flaps of such moderate length, that when brought together, they merely meet without straining: secondly, by sawing the bone where it is exposed, by simply separating the flaps, instead of drawing the muscles back, so as to divide it at a considerably higher point; and thirdly, by performing the operation at the lower third of the thigh. Mr. Liston recommends amputating at the middle of the bone, upon the ground of thus forming a more convenient stump for the attachment of an artificial limb, than would result from operating at a lower point.* For my own part, I have, during many years past, advised this high operation, to prevent the great risk, or almost certainty of protrusion to which the bone is exposed, when divided at or near its lower third. But the flap operation, being thus objectionable below the middle of the thigh, and even higher up, seldom in the end furnishing more than a covering of skin to the bone, it may be inquired how far the circular method deserves adoption in amputating at the lower third.

The true object of the circular incision, is to provide a covering of skin for the bone; and a great error has been committed by many, indeed almost all the would-be improvers of this operation, in directing their attention to modifying the division of the muscles, as if any form of their section could materially influence the result. All the attempts with this view, have been directed so as in one way or other, to give the cut surface of the muscles a conical form, evidently under the impression that they serve to assist in covering the bone. Now, it is quite clear, that if the ample masses of flesh afforded by the flap operation yield to the retractile agency of their tissue, the scanty por-

* Mr. Gray, of Davies-street, who is, I believe, the most eminent constructor of artificial limbs in London, informs me, that for the purpose of adaptation, he greatly prefers *long* stumps, especially of the thigh.

tion obtained by any form of circular incision, cannot have the slightest effect in improving the condition of the stump. These wrong directed efforts would have done no harm, unless they had withdrawn attention from what was really required to render the result satisfactory. In this way, however, they have seriously opposed improvement, and in my own instance, I confess, long prevented the truth from being distinctly seen.

The perfect condition of stump resulting from amputation at the ankle, where there is nothing but integument to protect the bone, led me to conclude, that if the circular operation could be performed with the certainty of providing such a covering, it might be employed with advantage in the lower third of the thigh, which, being the thinnest part of the limb, most readily admits of forming a stump composed merely of skin. There is also, in operating here, plenty of room to apply the tourniquet without impeding the incisions or retraction of the muscles, and the size of the wound inflicted is, of course, much smaller than that of an amputation at the middle of the thigh. In the course of this summer, I have performed the operation four times on adult patients, with the effect of confirming the favorable expectation which the considerations just mentioned had led me to entertain; and I now feel warranted to advise, that whenever a case requiring amputation of the thigh admits of the limb being removed at its lower third, the circular method should be employed.

The compress of the tourniquet should be applied over the artery close to the groin. Instead of the old-fashioned, concave-edged, thick-backed, amputating knife, a middle sized one of the kind employed for the flap operation, will be found more convenient. The incision of the skin should be made as near the knee as possible, not in a circular direction, but so as to form two semilunar edges, which may meet together in a line from side to side, without projecting at the corners. The fascia should be divided along with the integuments, which are thus more easily retracted—not by dissecting and turning them back, but by steadily drawing them upward, through means of the assistant's hand firmly clasping the limb. This should be done to the extent of at least two inches, or more, if the thigh is unusually thick. The muscles are then to be divided as high as they have been exposed, by a circular sweep of the knife, directly down to the bone, from which they must be separated and retracted with the utmost care. In ordinary circumstances, the retraction should not be less than two inches, and before using the saw, the bone must be completely exposed by means of a cloth split up the middle, applied on each side of it, and forcibly held up.

If due attention be paid to these directions, I feel confident that amputation by circular incision at the lower third of the thigh will afford

satisfactory results, and should therefore be preferred to the flap operation, at a higher part of the limb, when the circumstances leave room for choice. Where it is necessary to amputate at or above the middle of the bone, there can be no question as to the propriety of operating by the flap method.

Before arriving at the conclusion which has just been explained, I thought that amputation at the knee might be employed, with advantage, as a substitute for the flap operation, at the middle of the thigh; and my opinion would still be so, if this alternative afforded the only room for choice. I operated at the knee with complete success in three cases, two of which were diseases of the joint; and the other a recent injury, from the leg having been torn off by machinery. But as the soft parts required to form the stump in this situation, are apt to be so deranged in their texture as to delay, though not prevent recovery, and thus, in some measure, counterbalance the advantage of exposing cancellated, instead of dense bone, together with the contents of its medullary cavity, I do not persist in advocating amputation at the knee, now when satisfied that the operation by circular incision, if performed with due care, on proper principles, may be employed at the lower third of the thigh, safely and advantageously.

HIP-JOINT.

The thigh may be amputated at the hip-joint; but in this case the shock inflicted on the system is so great, and the wound which remains to be healed is so extensive, that the operation ought never to be performed unless the patient's situation affords him no other chance of escape from certain and speedy death. There are various modes of operating, the choice of which must be regulated by the circumstances of the case, but in general the following will be found the most eligible, in respect both to the ease of its performance and to its results.

An assistant should grasp the limb as high as possible, pressing with his thumbs upon the artery in the groin, where it lies on the brim of the pelvis, and with his fingers upon the hip. Then the surgeon introduces the point of a narrow knife about ten inches long, nearly half-way between the spinous process of the ileum and *trochanter major*, thrusts it through obliquely behind, so as to come out just below the tuberosity of the ischium, and then, while the limb is abducted, completes the flap by cutting downward close to the posterior surface of the bone. The assistant should now transfer the fingers of one hand to the bleeding surface, and compress directly the mouths of the arteries that seem to be largest. The operator next inserts his knife between the fore part of the bone and parts that remain to be divided, and cuts down along it so as to obtain a large

flap on the inner side to compensate for the smallness of the first one. While this is doing, the assistant should place the fingers of his hand which has hitherto rested on the pubal side of the limb, in the breach formed by the knife, so as to compress still more certainly the femoral vessels, which will not be cut across until the flap is nearly completed. The limb being now strongly abducted, the surgeon cuts round the pubal margin of the acetabulum, sufficiently to let the head of the bone escape; after which the muscular and ligamentous connections that remain are easily separated.

Fig. 28.



This operation can be performed very rapidly, affords plenty of room to the assistants for compressing the vessels, renders the previous ligature of the artery unnecessary, and leaves ample materials for a good stump.

FORE-ARM.

The fore-arm ought to be amputated by making two equal flaps, from before and behind; the arm being held while this is done in the middle state of supination and pronation, in order to relax the muscles equally, and thus facilitate the operation. The hand may be removed at the wrist-joint by transfixing the limb laterally and forming a flap from the palmar aspect; but the longer stump thus obtained is not found to facilitate the adaptation, or increase the utility, of an artificial hand; and the large articular surface which remains, though it may not materially delay the cure, must always cause deformity.

ELBOW-JOINT.

The arm may be amputated above the elbow, either by double flap, or circular incision; but the former mode is greatly preferable. A tourniquet is here quite unnecessary, as the vessel can be compressed easily and effectually by the hand placed over it at the inner edge of the biceps.

SHOULDER-JOINT.

Amputation at the shoulder-joint is not unfrequently required, and may be performed in various ways, with three of which the surgeon should be familiar, as the state of the parts concerned sometimes leaves no room for choice.

1. The surgeon introduces the point of a long narrow knife a little

nearer the clavicle than the middle space between the acromion and coracoid processes, thrusts it downward and backward until it issues at the inferior margin of the axilla, and then cuts in the same direction, so as to form a large external flap. Having, in doing this, cut through part of the capsular ligament, he has no difficulty in passing the knife round the head of the humerus, and making a suitable flap from the remaining parts, the assistant introducing his finger as soon as sufficient room is afforded for the purpose, and compressing the vessel. If the left arm is the subject of operation, the knife may be introduced at the lower margin of the axilla, and brought out at the point where it is entered in the former way.

2. The circulation through the subclavian artery being arrested by pressure with the thumb above the clavicle, where the vessel issues from between the *scaleni*, and rests on the first rib, the surgeon thrusts a sharp-pointed knife down to the head of the humerus, immediately below the acromion process; and cutting downward in a semilunar direction, first on one side, and then on the other, so that the two incisions meet in the axilla, he forms two lateral flaps, which, being dissected back, expose the joint, and enable him to effect the disarticulation very readily, by pushing his knife through the capsular ligament, and then cutting round the glenoid cavity.

3. The surgeon cuts in a semilunar direction from one side of the deltoid to the other, so as to form a large flap of this muscle, which, being dissected from its subjacent connections and held up, exposes the joint, allows the disarticulation to be completed, and permits the fingers of the assistant to be introduced to compress the vessels before they are divided, together with the remaining muscles and integuments, by a transverse incision.

After all of these operations, of which the one first mentioned should be preferred when circumstances permit its performance, which is generally the case, the arteries ought of course to be tied, the edges of the flaps stitched together, and a proper bandage applied.

AMPUTATION AT THE WRIST

May be preferred, because more covering can there be sometimes secured from the thumb and palm than from off the bones above; and because it leaves a stump terminating into firmly connected ends of bone. After describing the usual mode of operating, I will relate a case where I resorted to this method *not* "under very peculiar"—at least not *favorably* "peculiar circumstances."

[For this operation, the brachial artery should be secured as for amputations of the arm above. An assistant supports the fore-arm, and draws back the skin from over and under the wrist. A semilunar incision is then made, with the convexity downward, on the

back of the hand ; the flap dissected and turned up past the joint, and the joint opened from that side. The ligaments and tendons are freely

Fig. 29.



cut through, and disarticulation effected, the knife being carried through the joint (see plate, Fig. 29), and downward and forward on the inside. The palmar flap should be the longer, as it is thicker and better than the other. Arteries have to be secured and everything completed as in other cases.*—R. S. N.]

CHAPTER XII.

EXCISION OF JOINTS.

Owing to the improvements of modern surgery, more particularly in the treatment of aneurism, fractures, and necrosis, amputation of the extremities is now very seldom performed in civil practice, except cases of disease or injury of the joints. The size and complicated structure of these parts expose them in a peculiar manner to disease, and render it extremely unmanageable when affecting them. Their synovial membrane cannot be wounded without the risk of intense inflammation, and violent constitutional disturbance; and when altered in structure by diseased action, it is still more prone to inflame and suppurate, the consequences of which, though not so immediately dangerous to life, very frequently occasion the sacrifice of the limb. Their cartilage of articulation possesses little power of

* Eclectic Surgery.

action either in health or disease; but it is apt to be detached from the bone, and then to keep up irritation by its presence; and the spongy osseous tissue which enters into their constitution, instead of dying and exfoliating like the dense texture of the shafts when inflamed, readily passes into the obstinate condition of caries. Another circumstance which greatly increases the frequency of disease in the joints, is their disposition to suffer from the indirect irritation of constitutional disturbance, or, as it is expressed in common language, from disease fixing itself in a joint.

Though amputation is a measure very disagreeable both to the patient and to the surgeon, it has hitherto, with hardly any exception, been regarded as the only safe and efficient means for removing diseased joints which did not admit of recovery. The idea of cutting out merely the morbid parts, and leaving the sound portion of the limb, seems to have hardly ever occurred, or to have been met by so many objections that it was almost instantly abandoned. The serious consequences of wounds accidentally or intentionally inflicted on sound joints, gave this proposal the character of extreme rashness; and the unseemly as well as unserviceable condition of limbs, in which anchylosis had occurred, afforded little encouragement to encounter the hazard of an operation, which seemed to promise this as its most favorable result. In order to decide how far these objections are valid, it is necessary to ascertain what cases require and admit the operation.

Of these, by far the greatest number is presented by those affections of the joints, which are comprehended under the general denomination of White-Swelling. Notwithstanding the acute observations of Mr. Brodie, and the exertions of other modern pathologists, the precise seat and nature of these diseases at their commencement have not yet been satisfactorily ascertained; but the following facts, which are quite sufficient for the present purpose, do not admit of any question. Sometimes the synovial membrane is the part primarily affected, and, suffering a remarkable change from its usual structure, instead of being smooth, thin, and tough, becomes converted into a thick, soft, gelatinous mass, which exhibits no trace of its original appearance. Thus far the morbid process is attended with hardly any pain, or other inconvenience, except what proceeds from increased size or stiffness of the joint concerned. But, sooner or later, the symptoms of inflammation are perceived, the surface becomes red, pain is felt in the joint, and pressure or motion occasions much distress. Though there is great variety in the acuteness of these symptoms, from the slightest uneasiness to the most violent agony, they generally terminate in the same way, that is, in the formation of an abscess, which contains a thin sero-purulent fluid. It is not often that an opportunity occurs of laying open a joint at this stage of the disease;

but I have had occasion to do so, and can verify the statement of Mr. Brodie, that even then the cartilages and part of the synovial membrane which covers them, may be still, to all appearance, perfectly sound. If an opening is made naturally or artificially into this abscess, and its contents evacuated, a copious discharge, secreted by the morbid surface, continues to issue from it, until the patient's strength sinks under the weakening effect of the constant drain thus established, and the occasional attacks of inflammation which accompany it, or a cure is accomplished by anchylosis. When the disease is examined at the more advanced period, of which there is no want of opportunity, as this is one of the conditions in which amputation is most frequently performed, the synovial membrane does not display its gelatinous alteration so distinctly as before; it is collapsed, thinner, and, as it were, wasted by the suppurative process. The articulating surfaces are rough and unequally covered with cartilage, which in some places is merely thinner than usual, in others, ulcerated and discolored, and usually also detached in flakes of various size; while the cancellated structure of the bone is either exposed, or covered with a dark-colored fleshy growth.

In another description of cases, the cartilage seems to be the texture primarily affected. The patient complains from the first of pain, which is described as gnawing, deep-seated, and often confined to one particular point of the articulation; but, at the same time, he is often distressed with a pain shooting into distant parts of the limb, which generally becomes very weak, and sometimes altogether powerless. There is often considerable œdema of the limb below the joint affected; but at the seat of the disease, the swelling is in general not very remarkable at first; it gradually increases, however, and though usually said to be distinguished by smaller size, more limited extent, and firmer consistence from the swelling which attends the gelatinous alteration of the synovial membrane, it can hardly, so far as I have observed, be thus characterized with any certainty. On the contrary, the swelling has appeared to me to show every variety of size and consistence, which is not surprising, since, though the thickening of the synovial membrane may exist independently, the form of white-swelling at present under consideration, is almost always accompanied by more or less of it; and in both cases, the enlargement of the joint is in a considerable degree owing to the thickening of the surrounding cellular substance, tendons, and ligaments. In this, as in the former disease, there is seldom an opportunity of examining the joint, while the cavity remains entire; but sometimes the pain is so violent and unremitting, while the weakly frame of the patient is so little able to bear it, that the surgeon considers himself warranted to perform amputation; and then the following appearances are observed. The

cartilage is of a dark color, and seems as if erroded; there is very little fluid in the joint, indeed, I have seen it altogether wanting; the synovial membrane, except at the part where the cartilage is destroyed, may remain little altered, but much more frequently it is thickened and changed by the gelatinous degeneration which has been already described. There is ground for believing, that, if this ulceration of the cartilage, as it is called, be arrested at an early stage of its progress, the parts affected may be restored completely to their natural state; but it much more frequently terminates in anchylosis or suppuration. In the latter case, amputation affords abundant opportunity of examining the morbid appearances, which, in their advanced stage, are found to differ little from those observed in that form of the disease which originates in thickening of the synovial membrane.

There is still a third kind of disease comprehended under the title of White-Swelling, in which the bone is the tissue primarily affected. The symptoms are nearly the same as those which characterize the commencement of ulceration of the cartilage, viz: a deep-seated gnawing pain felt for some time previous to the appearance of swelling, with weakness and œdema of the limb. An abscess forms in the spongy extremity of the bone, and opens either on the external surface or into the joint. This affection is, for the most part, associated with thickening of the synovial membrane, and ulceration of the cartilages, so that the appearances which present themselves on dissection, after suppuration has taken place, are nearly the same as those observed in the last stage of the other kinds of white-swelling. The most remarkable difference consists in the bone being more deeply affected; sometimes it is enlarged and hollowed out into a shell, constituting the *spina ventosa* of the old surgeons; and, at all events, instead of having merely its surface reduced to the carious state, it is hollowed out into a cavity which often contains fragments of dead bone, and exhibits the characters of caries over the whole extent of its interior.

The treatment of these different diseases may be divided into that which is proper before, and that which is required after suppuration. In respect to the first of these stages, it will be recollected that the symptoms are either acute or chronic. For the former, the abstraction of blood generally, and locally by leeches or cupping, is most suitable, while the chronic symptoms, generally speaking, are most under the control of counter-irritation.

[Tonics and alteratives are the agents I employ in these cases. That bleeding in these cases is of positive injury, there can be no question. Evidently, surgeons have not paid as much attention to prognosis as could be wished. I have so often given my reasons for objecting to this practice, that I need not repeat them here.—R. S. N.]

Blisters, warm plasters, and pressure, are most useful in the chronic

state of the thickening of the synovial membrane. The practice of applying pressure, together with some liniment to promote absorption, has been lately brought very prominently forward by Mr. Scott,* who, in his treatise, gives many cases of what he alleges to be perfect cures obtained by its means. Some of these cases must appear very surprising to every practical surgeon; and, though not inclined to go quite so far as Mr. Brodie,† who denies the possibility of recovery in this disease altogether, I must say that my experience would lead me to a very different opinion as to the facility of cure from that of Mr. Scott. As there can be no doubt, however, that nothing conduces more to retard the progress of the disease than rest conjoined with pressure, I should be sorry to oppose myself to this plan of treatment; and to prevent an abuse of it, which I have frequently had occasion to regret, it would be well to recollect that it can be serviceable only when it does not occasion pain, since everything which does so must tend to strengthen and accelerate the morbid action. In the other forms of white-swelling, those namely, in which the cartilages and bones are principally affected, there is no remedy so beneficial as the actual cautery. Issues may, it is true, be opened by other means, but by none so effectually as by this. There is a prejudice against the cautery, from its appearing a very severe remedy; but every one who has compared its effects with those of caustic, must admit that the pain occasioned by it is infinitely less prolonged, and perhaps hardly more severe, even during the instant of its application; and it is worthy of notice, that, though the use of the red-hot iron to effect counter-irritation was introduced here by myself, I have never been prevented from employing it by prejudice on the part of the patients.

In the second stage of the disease, that is to say, after matter is formed, it comes to be a question whether the surgeon should evacuate it, or wait for a natural opening. The objection to interfering is, that the case generally assumes a much more unpromising aspect when the abscess is opened; and it is difficult to prevent the patient or his friends from attaching some degree of blame to the pratitioner, when he has hastened, or, as it may seem to them, has caused this disagreeable change by making an aperture. The objection, on the other hand, to waiting for the natural process is, that the patient sometimes suffers great pain, and an injurious extension of the abscess, from delay. The safest course is to be guided by circumstances, and to make the opening in question only when it is indicated by the distress of the patient, and the tension of the swelling. I have seen abscesses connected with disease of the vertebræ and hip-joint exist for years

* Scott on Diseases of the Joints. London, 1828.

† Treatise on the Joints, p. 99.

without occasioning the patient much inconvenience, but prove rapidly fatal on being opened.

The treatment at this stage consists of dilating the sinuses; applying metallic washes, such as the solutions of acetate of lead, and sulphate of zinc; effecting moderate pressure on the joint; keeping the limb steady by means of splints; and supporting the patient's strength by nourishing food and exercise, so far as it can be accomplished without causing irritation by the motion. The chance of recovery varies very much with the age and strength of the patient; it is greatest in childhood; next in youth; and least of all in the adult age, at which time of life, indeed, there is hardly to be any expected. In very young children again, if the exhaustion occasioned by the disease does not prove too great for the strength of the patient, there is considerable prospect of a cure by anchylosis; and it appears daily from experience, however improbable and paradoxical the statement may seem, that the more unhealthy the individual is, especially if he is so much so as to be affected in more than one of his joints, the greater is his chance of recovery, provided he is able to undergo the process. The reason of this is probably the weakness of vital action in the osseous tissue of such subjects, which renders the spongy bones nearly as ready to die and exfoliate as the dense tissue of the shafts; and the diseased portions accordingly separate sometimes in masses of considerable size, but more frequently in small particles, which might easily pass without notice, unless they were looked for. It is possible also that the diseased action or caries of the bone may not be quite so incorrigible at this early period of life as experience proves it to be at a more advanced age, and may, therefore, be cured without the death and exfoliation of the affected portion.

When white-swelling does not terminate in a spontaneous cure, it either remains obstinately in the same state for an indefinite period, or destroys the patient by exhausting his strength. In these circumstances, there are two modes of affording relief—viz: amputating the affected limb, and performing the operation which it is the object of this treatise to recommend; but before comparing the respective merits of these two procedures, it will be right to say a few words as to the other cases in which it is necessary to make a choice between them. These are either the consequences of inflammation induced by injuries, or the immediate effects of external violence. In the former, the state of parts differs little from that which has already been described as existing in the last stage of white-swelling. In the latter, there is merely such an injury inflicted as experience leads us to consider incurable. The judgment to be formed in such cases depends so much on the particular joint concerned, that it is difficult to make any remarks of general application. I will, therefore, delay making any

attempt to ascertain what injuries require immediate operation, as well as the mode of operating best suited to the occasion, until the excision of the joints in particular is considered, and will now proceed to compare the merits of this operation with those of amputation in the other cases that have been mentioned.

The advantages of amputation are, that it quickly, easily, and effectually removes the disease; but these are balanced by the serious objection of its depriving the patient of a limb; and, it may be added, that, though this operation cannot now be regarded as attended with much danger, it is certainly not by any means free from it. To say nothing of the ordinary bad consequences of amputation, I must here particularly notice the risk of inflammation and suppuration of the lungs, or other internal organs, which renders the result of amputation for caries so unsatisfactory, especially in hospitals. Every one who has attended the Hotel-Dieu must have remarked the frequency of death, or rather the rarity of recovery after the removal of limbs in such circumstances; and though the evil seldom goes to such an extent in other places, I am sure all practical surgeons must be familiar with it. It is also observed that adult patients who have suffered amputation for caries often fall into bad health, and die of dropsy or some other chronic complaint within a year or two after the operation. These bad effects seem referable with most probability to the disturbance which is excited in the system by taking away a considerable part of the body; but, whatever be the true explanation of them, there can be no doubt as to the fact of their occurrence, which ought to be carefully remembered in making the comparison that is now attempted.

The great recommendation of excision is, that it saves the patient's limb; and the benefits accruing to him from this are so important and conspicuous, that, unless the objections which can be urged against it should appear after mature consideration to be very serious indeed, we ought not to hesitate in giving it the preference. These objections, so far as I have been able to ascertain, are the following: 1. The difficulty of the operation. 2. Its danger. 3. The useless condition of the limb in which it has been performed.

In taking into consideration the difficulty of the operation, it must be ascertained, in the first place, what is requisite to constitute its effectual performance; in other words, how far it is necessary to take away the diseased integuments, synovial membrane, articulating cartilage, and extremities of the bones. In cases of old standing, where the sinuses are numerous and the suppuration has been profuse, the integuments surrounding the joint often retain hardly any trace of their original appearance or structure. They lose their laxity and mobility, from effusion of lymph into the subjacent cellular substance;

become smooth and shining on the surface, which is often of a dark-red or purple color; and are so soft, that, if stitches are introduced to approximate the edges of an incision made in them, the threads instantly cut their way out. It might, therefore, be supposed that no healthy union or permanent cure could be obtained if parts in such a morbid state were allowed to remain, and that, consequently, the operation could very seldom be practiced with propriety. Experience, however, has shown that is not the case; and that in a very few days after the operation, when the swelling and inflammation immediately consequent upon it begin to subside, the diseased integuments regain their natural characters, and ultimately become perfectly sound.

As to the synovial membrane, Mr. Brodie has stated his opinion, that, when once its structure has been completely altered, it cannot be restored.* Independently of his high authority, it might be readily believed, that, if any of the thick gelatinous substance into which this membrane is transformed were permitted to remain, a cure could hardly be accomplished; and that, as this portion of the articular apparatus is not only very extensive, but likewise most intimately connected with the surrounding tissues, it must consequently be next to impossible to perform the operation of excision effectually. Experience here also, however, has decided the matter to be otherwise; and it is proved beyond dispute, by the facts hereafter to be mentioned, that the synovial membrane, though thickened and gelatinized to the utmost, affords very little obstacle to recovery, since it speedily disappears, partly by sloughing, but chiefly through the absorbent action of its own vessels, during the copious suppuration which ensues.

With regard to the cartilage, it might be expected that no harm could result from leaving any part of it that remained sound; but here, too, the judgment of theory is reversed by experience, since it has been found, that, when any portion of the articulating surface was left, the disease required a subsequent operation. The cause of this is probably to be referred, not so much to any morbid process in the cartilage itself, as in the synovial membrane lining it, and in the spongy bone immediately subjacent, which has its tendency to morbid action excited by the injury sustained in its neighborhood. The operation, therefore, essentially requires the removal of the whole cartilaginous surface.

Lastly, as to the bone, one not acquainted with the pathology of the osseous tissue, who examined the bones of carious joints after maceration, might be apt to suppose that the diseased part could not be removed without sacrificing so large a portion of the whole, as to render it useless and unworthy of preservation. The bones referred to

* Vid. Op. et loc. cit.

here are those of an elbow-joint, which I amputated before adopting the plan of treatment now under consideration. It will be observed that they are much increased in thickness to a considerable distance from the articulation, and that their surface in the whole of this extent is covered with irregular warty excrescences, which give it a rough tubercular appearance. When these tubercles are examined more particularly, they are found to consist of a compact osseous substance, which is smooth on the surface, and perforated with numerous apertures for the transmission of bloodvessels. This is new bone, and perfectly healthy in its actions; it resembles in all respects the callus, or new osseous substance, which effects the reparation of fractures and is thrown out in consequence of the irritation of the disease.

When the morbid action commences in the synovial membrane or cartilage, it is generally superficial; but when the inflammation is primarily seated in the substance of the spongy bone, as in the third kind of white-swelling which has been mentioned, then, as has been already stated, the substance of the bone is more deeply affected, being often excavated into a hollow, which is carious over the whole of its surface. The extent of this cavity seldom, or rather never, exceeds the bounds of the epiphyses, except sometimes in young subjects, where the bone has been widely altered by scrofulous action, previous to suffering the inflammation which more immediately occasions the caries. From not distinguishing between the truly diseased bone and that effused in consequence of its irritation, it appears that a much larger portion has been taken away in some of the cases of excision hitherto published, than there was any occasion for. Less than a half of the portions of the humerus and femur which were removed by Moreau and Crampton, I should certainly think, so far as can be judged from the evidence of their drawings, would have been sufficient for the purpose, in which case it is plain the limbs would have been much less shortened and weakened, and the magnitude and consequent severity of the operation diminished. As already stated, the caries seldom goes beyond the epiphyses, which are all the part of the bone that the surgeon requires to remove, except in the rare cases where the bone is found to be more extensively affected; and in these it will probably be most prudent to perform amputation.

From this analysis of the operation, it appears that all it essentially requires is the removal of the articulating epiphyses; and the next question that presents itself is, by what means is this to be accomplished? It is difficult to divide bones by means of a common saw, unless they are fairly exposed and held steady; and as these conditions can seldom be obtained in operating on the extremities forming a joint, various modifications of this instrument have been contrived for the purpose. Of these the most ingenious are the chain-saw of

Dr. Jeffrey, Machell's saw, and other kinds of rotatory saw; but it is quite unnecessary to enter into either any description of these instruments, or inquiry as to their respective merits; for they are all complicated in their structure, and perplexing in their application, when employed under the adverse circumstances of a deep situation, bleeding, and diseased soft parts, that obscure the bone, and the restlessness of a patient suffering a severe and protracted operation. Were it absolutely necessary in any case to use a saw for this purpose, I should certainly prefer the common one, believing it both much easier and much safer to expose the bone sufficiently for permitting its application by free incision, than to overcome the difficulties attending a less complete exposure by the mechanical contrivances in question. But fortunately we are not reduced to this disagreeable alternative, since the cutting-pliers which have been introduced into operative surgery with so much advantage by Mr. Liston, enable us to attain the object in view with perfect ease, whenever the ordinary saw is not applicable. That there is no difficulty at all in the operation of excision, it would be absurd to affirm; and that in some joints, particularly in certain states of disease, it is extremely perplexing, I am ready to admit; but when the object to be gained is the saving of a limb, the trouble or difficulty of its attainment ought not to be considered an objection; and from what has been said, it will, I trust, appear that there is nothing required in this operation except what a moderate share of dexterity and coolness is sufficient to achieve.

The next question respects the danger of the operation. Here it ought, in the first place, to be recollected, that there is no parallel between a wound inflicted on a sound joint, and that by means of which a carious articulation is cut out. In the former, unless the solution of continuity heals by the first intention, inflammation must necessarily supervene, when all the complicated, extensive and irritable apparatus of articulation will be ready to suffer with its usual intensity and constitutional disturbance. In the latter case, the joint is already open, there being always one or more sinuses leading into it in the advanced stage of the disease which renders the operation of excision warrantable, so that the wound which the surgeon makes cannot, merely on account of exposing the cavity of the joint, be the cause of inflammation; and even though inflammation were to happen, its bad effects would be comparatively inconsiderable, since the structure which is so apt to be violently affected is removed by the operation. But this is not all; for the effect of cutting out the diseased parts is rather to allay than excite irritation, both by removing a source of constant gnawing pain, and at the same time freeing the limb most effectually from tension. Hence patients have been observed to sleep better the night after the operation than for a long time previously.

It also ought not be forgotten, that the question here is, not whether the cutting out of diseased joints be attended with *any* danger, but whether this operation is more dangerous than amputation? And if, in addition to what has been said already, it be kept in mind that in excision the great nerves, arteries, and veins are not divided, that there is hardly any loss of blood, and that the system is not subjected to the disturbance which results from taking away a large part of the body at once, it seems to me not unreasonable to conclude, that the danger is greater in amputation. But experience here too may assist in settling the point. I have cut out fourteen elbow-joints, and the operation has been performed in Edinburgh three times by other practitioners; of all these seventeen cases only two have terminated fatally; and in one of them the patient would, I believe, have died from any operation whatever, while in the other, the disease was found so extensive as to render the excision almost impracticable. I believe the result of seventeen amputations in similarly unfavorable constitutions would not be so satisfactory. I am aware that some may think it unnecessary to prove that the risk attending excision is not greater than that of amputation, since the great advantage of saving the limb might be thought sufficient to counterbalance some additional risk; but I have no hesitation in declaring, that, in such circumstances, I do not think a surgeon would be warranted in recommending the operation. The great object of medicine is the preservation of life, and the patient's mere convenience ought always to be reckoned a secondary consideration. Thus, if the fair induction from extensive experience, should satisfy us that the limbs of ten persons laboring under diseased joints might be amputated with the probability of saving the lives of nine out of the whole, while excision of the joints would probably prove fatal to two, so that only eight would recover, though the condition of the eight would doubtless be preferable to that of the nine, I do not think this advantage ought to be regarded as sufficient to balance the life that would be lost. Having, however, as I hope, shown reason for thinking that the greater danger, generally speaking, proceeds from amputation, I will proceed to consider the last objection that has been alleged against excision, viz: that the limb thus preserved is useless, and not worth the pain or trouble required for its preservation.

It has been said, that after the joint is cut out, the bones must either unite together, so as to render the limb rigid and unserviceable, or, if it remain movable, the attachments of the muscles having been separated, it must be no less unfitted for use by its flaccidity and want of subjection to voluntary motion. With regard to the first of these events, I think it cannot be denied that anchylosis of the shoulder or elbow, provided the other joints remained entire, so far from rendering

the limb useless, would not prevent many of its usual actions, and certainly not to the extent of permitting it to be compared, in respect of utility, with an artificial substitute. But it has been ascertained by the sure decision of experience, that true anchylosis or osseous union does not occur generally or even frequently in these circumstances; indeed, I feel authorized to say, not without very great attention on the part both of the surgeon and patient in favoring its accomplishment, particularly in preserving absolute rest; but when no such precautions are used, the union is established by means of a tough, flexible, ligamentous-like substance that permits the bones to be used with more or less freedom, according to the exercise which they are made to undergo during the process of healing. And the voluntary motion, though at first impaired or altogether lost, owing to the relaxation of the muscles, which is caused by the approximation of their attachments, necessarily resulting from the shortening of the bones, gradually returns, and ultimately becomes as strong as ever. What seems to occasion the greatest difficulty in conceiving the possibility of recovering voluntary power over the new joint, if joint it may be called, proceeds from inattention to the fact, that muscles or tendons, when cut away from their attachments, fix themselves to the parts on which they come to rest. Thus the muscles of a stump adhere round the bone, so as to enable the patient to use it with force and freedom; and when amputation is performed through the tarsus, the *tibialis anticus* and extensors of the toes fix themselves so as to counteract the extensors of the heel. Independently of theory, however, we have here the more satisfactory assurance of positive facts; and the cases related below, will, I trust, be considered sufficient evidence to show that it is possible to save by excision of diseased joints, nearly, if not altogether, as useful as before they suffered from disease.

In addition to the arguments against excision which have now been considered, it has also been objected that the operation affords no assurance against a return of the disease; but as this objection applies equally to amputation, it need not be taken into account.

METHOD OF PERFORMING EXCISION OF THE JOINTS.

Having now considered the objections which, so far as I know, have been urged against the operation of excision, I will next make some general observations on the mode of performing it, and the treatment to be followed subsequently. As the operation is painful and tedious, the patient ought to be placed in that position which most completely exposes the articulation, and can be preserved steadily with least inconvenience. I have never found it necessary to apply a tourniquet; but if the patient is very weak, and the surgeon is anxious to prevent the loss even of a small quantity of blood there can be no objections

to its application. The knife which seems to answer best for the requisite dissection is a long, narrow scalpel, straight in the back, and very slightly convex in the edge, stoutly made, and having a small part of the back ground off obliquely at the point, so as to render it less apt to be broken, and bring it to correspond with the axis of the handle.

The preliminary incisions ought to be free, and so directed as to facilitate as much as possible the exposure and removal of the ends of the bones. In making them, the knife should be thrust at once into the joint, and afterward carried close down to the bones, which is much better than cutting by degrees, as it shortens the operation, lessens pain, and renders the line of direction of the incision more determined. It is always necessary, of course, to divide more or less of the muscular and tendinous parts; but they ought to be as little injured as possible, and the most effectual method of saving them, is to cut them close away from their attachment.

It is impossible to form any idea of the kind of difficulty which is encountered in performing this operation on the living body from trials made on the dead subject where the parts are not diseased. The thickening and condensation of the cellular tissue, together with the gelatinous synovial membrane, which invests the articulating extremities of the bones, and fills the space between them, throw many obstacles in the way of an unpracticed operator, by disguising the different tissues, and matting them into one, so that the articulation requires, as it were, to be carved out of a homogeneous mass.

The saw employed for removing the bones may be either a simple blade, or the one in common use for amputation, which is, I believe, on the whole, the most convenient for the purpose. For defending the soft parts while the bone is undergoing division, flexible copper spatulas have been recommended; but I have always found the hand a more convenient and effectual guard; and instead of cutting completely through, it is often better to divide the bone only partially with the saw, and then resort to the cutting-pliers, which readily detach the fragment so soon as there is a groove formed for the reception of their blades. Unless the bone is very large and hard, the pliers are of themselves sufficient for the purpose. It is worthy of notice, that the flat sides of the blades ought to be turned toward the surface of the bone which is to remain, as it will thus be less apt to be splintered or irregular. When all the diseased bone has been got away, which will be learned by a careful examination of the separated fragments and the remaining surface, if there are any large masses of gelatinous substance which can be easily detached, it is as well to remove them, since, though they would not afford any great obstacle to recovery, they might have some effect in retarding it, and also preventing

the edges of the wound from coming readily together. Though the hemorrhage is generally pretty free in the first instance, it seldom persists so as to require the application of ligatures. The general oozing from the surface is usually soon checked by exposure to the air, or washing with cold water; but if, after the operation is ended, one or more arteries should continue to throw out a jet, they ought to be secured, as it is next to impossible to exert pressure with any effect, and considerable inconvenience is apt to result from the cavity becoming distended with blood. The vessels that prove obstinate are generally situated in the indurated subcutaneous cellular tissue, and require considerable care both for their discovery and ligature.

The next part of the process is to place the edges of the wound in contact, and retain them together, which is best effected by the interrupted suture, unless the integuments should be so very soft as to give way under the pressure of the threads, in which case compresses of lint must be used in their stead. It is always of most consequence to unite the edges of the transverse incision, if there is one, since, if they do not heal by the first intention, they are afterward brought together with very great difficulty, and the broad cicatrix which results from their separation, is very adverse to the mobility of the joint. Some compresses of lint ought to be applied over the flaps, and then the limb being placed in a proper position, that, namely, in which it will most frequently be required after the cure is completed, it ought to be enveloped with a long roller, which affords the requisite support much better than splints or rigid cases of tin or pasteboard.

The constitutional disturbance, for the reasons already stated, is usually very slight, and requires nothing more than a gentle purgative or slight antimonial, with spare diet and rest. The pain is usually severe for the first five or six hours, but then subsides, and seldom proves troublesome afterward. The dressings ought to be changed ten or twelve hours after the operation, by which time the oozing of blood and serum will be at an end; and then also any inequality or gaping of the edges may be rectified by slips of sticking-plaster. Union by the first intention sometimes takes place through nearly the whole line of incision, except where old sinuses exist in its course; more frequently the adhesion is only partial, and the wound opens out more or less widely, according to the degree of local inflammation, and the distension caused by blood contained within its cavity. In the course of a few days, the discharge, which was at first copious and offensive, begins to diminish; all the clots of blood issue from the wound; the swelling subsides; and the favorable change is altogether so sudden and satisfactory, as to surprise those who are not accustomed to witness the operation.

During the cure, every means is to be employed either to keep the

limb perfectly quiet, to favor anchylosis, or to exercise it in the degree and extent of mobility which will be required of it. The wound is generally very nearly healed in the course of a few weeks, but one or more sinuses continue to discharge for months, or even a year or two. Small portions of bone also occasionally come away; but if the surgeon has done his duty in the first instance, he need not be under any apprehension on these accounts; and the patient will be too well pleased with being freed from the pain of his disease, and having regained the use of his limb, to feel annoyed by the trifling inconvenience which he thus experiences.

EXCISION OF THE SHOULDER-JOINT.

In proceeding to treat of the excision of the different joints in particular, I think it best to begin with that of the shoulder, because this was the one first subjected to the operation.

The shoulder-joint, like others of the ball and socket kind, is very little subject to disease originating in the synovial membrane; but inflammation of the bone, and subsequent caries of the articulating surfaces, are of more frequent occurrence. The disease is generally referred to some bruise or other external injury, and commences with deep-seated pain of the shoulder, which is more or less acute, and generally most severe at night; this pain is not confined to the joint, but shoots down the limb, and is particularly complained of about the elbow. The deltoid and other neighboring muscles are weak, or even powerless; and they are also soft and relaxed, so that they seem smaller than usual, and hence give the shoulder a flattened appearance, which is increased by an œdematous swelling that generally exists in the lower part of the limb. If the actual cautery be used freely and early, and the best place for its application is, I believe, either the hollow at the posterior edge of the deltoid, or that between the deltoid and *pectoralis major*, it has a powerful effect in arresting the morbid action; but if the case is trusted to less efficacious remedies, or allowed to follow its own course without any interference, in the process of time matter is formed, and the bones pass into the state of confirmed caries. The progress of the disease is generally slow, sometimes requiring years to arrive at its height; but it is not the less sure; and I have therefore been particular in describing it, as its comparative rarity and resemblance in some respects to ordinary cases of rheumatism, render it apt to be overlooked, or treated with too little attention. When the abscess opens, it is not easy to reach the carious bone with a probe, owing to the tortuous course which the sinuses usually take; and it has even been found impossible to do so, notwithstanding every care, and the assistance derived from curving the instrument. In such cases, the history of the disease must be the

surgeon's guide; and if he feels authorized to operate, he ought to commence so as to ascertain the true state of the parts, without inflicting any more injury than is absolutely necessary, lest he should prove to have been mistaken.

There is no case in which excision is so decidedly preferable to amputation as caries of the shoulder-joint. The diseased bone can here be readily cut away without injury to any important organ, and the object gained is no less than the preservation of the whole superior extremity. When amputation again is performed, beside the severe loss which is sustained, there is a division of the large nerves and blood-vessels, and also the sudden removal of a large portion of the body, consequently a much greater risk of local and constitutional disturbance.

In 1768, Mr. White, of Manchester, treated a case, of which he gives the following relation:

"Edmund Pollit, of Sterling, near Cockey-Moor, in this county, aged fourteen, of a scrofulous habit of body, was admitted into the Manchester Infirmary, April 6, 1768. The account I received with him was, that he had been suddenly seized, about a *fortnight before*, with a violent inflammation in his left shoulder, which threatened a mortification, but at last terminated in a large abscess, which was opened with a lancet a few days before his admission. The orifice was situated near the axilla, upon the lower edge of the *pectoralis major*, and through it I could distinctly feel the head of the *os humeri*, totally divested of its bursal ligament. The matter, which was very offensive, and in great quantity, had made its way down to the middle of the humerus, and had likewise burst out at another orifice, just below the *processus acromion*, through which the head of the *os humeri* might easily be seen. The whole arm and hand were swelled to twice their natural size, and were entirely useless to him. He suffered much pain, and the absorption of the matter had brought on hectic symptoms, such as night sweats, diarrhea, quick pulse, and loss of appetite, which had extremely emaciated him.

"In these very dangerous circumstances, there seemed to be no resource but from an operation. The common one in these cases, that of taking off the arm at the articulation with the scapula, appeared dreadful, both in the first instance and in its consequences. I, therefore, proposed the following operation, from which I expected many advantages, and performed it on the fourteenth of the same month. I began my incision at that orifice which was situated just below the *processus acromion*, and carried it down to the middle of the humerus, by which all the subjacent bone was brought into view. I then took hold of the patient's elbow, and easily forced the upper head of the humerus out of its socket, and brought it so entirely out

of the wound, that I readily grasped the whole head in my left hand, and held it there till I had sawn it off with a common amputation saw, having first applied a pasteboard card betwixt the bone and the skin. I had taken the precaution of placing an assistant, on whom I could depend, with a compress just above the clavicle, to stop the circulation in the artery, if I should have the misfortune to cut or lacerate it, but no accident of any kind happened, and the patient did not lose more than two ounces of blood, only a small artery which partly surrounds the joint being wounded, which was easily secured.

"He was remarkably easy after the operation, and rested well that night; the discharge diminished every day; the swelling gradually abated; his appetite returned; and all his hectic symptoms vanished. In about five or six weeks, *I perceived the part from which the bone had been taken had acquired a considerable degree of firmness, and he was able to lift a pretty large weight in his hand. At the end of two months, I found that a large piece of the whole substance of the bone that had been denuded by the matter, and afterward exposed to the air, was now ready to separate from the sound, and with a pair of forceps I easily removed it.* After this exfoliation, the wound healed very fast, and on August 15, he was discharged, perfectly cured. On comparing this arm with the other, *it was not quite an inch shorter. He has the perfect use of it*, and cannot only elevate his arm to any height, but can likewise perform the rotatory motion as well as ever. The figure of the arm is no ways altered, and from the use he has of it, and its appearance to the eye and to the touch, I think I may safely say the head, neck, and part of the body of the *os humeri* are actually regenerated.

"*I could not help being surprised to find so much strength and firmness, as evidently showed a regeneration of the bone, before the lower part had exfoliated, or even before it had begun to loosen. The osseous matter could not proceed from the scapula, the glenoid cavity of that bone not being divested of its cartilage; could it then possibly escape from the end of the sound bone, before the morbid part had begun to separate from it?* or are there any vessels that could convey the bony matter, and deposit it in the place of what had been removed."*

I have put some expressions in italics, which seem to me of importance in explaining the true nature of this case. It is quite clear, from an attentive consideration of it, that it was not one of caries, but an instance of that acute necrosis which is so frequently met with in the finger, and occasionally also in the larger bones (See first Quarterly Report of the Edinburgh Surgical Hospital, Ed. Med. and Surg.

* Cases in Surgery, by Charles White. London, 1770, p. 57.

Journal, No. 101). This will account for the facility of the operation, and also its great success, particularly in respect to the length of the limb, which was not diminished. In all the other cases of excision which have hitherto been published, there was uniformly a degree of shortening proportioned to the extent of bone removed; yet, though nearly four inches were taken away by Mr. White, the limb was not perceptibly shortened. It may be asked, how is the explanation easier on the one supposition than on the other? Why should new osseous matter be effused to repair the loss of substance caused by necrosis, and not after the excision of bone? These are difficult questions, and the only answer to them that I can offer, is the well-known fact, that there is a much greater disposition for the effusion of new bone in the one case than in the other. It is probable too, that the foundation of a substitute may have been laid previously to the operation; indeed, it is quite clear that this must have been the case with regard to the second portion removed by Mr. White. My reasons for giving such particular attention to this case are: 1. Because it led the way to all that has been done in this department of surgery; and 2. Because erroneous opinions regarding its real nature, arising from the superficial consideration of it, have rendered the result so difficult of belief as to throw an air of absurdity over the whole subject.

Soon after the publication of Mr. White's case, his example was followed by Mr. Bent, of Newcastle,* and Mr. Orred, of Chester.† It appears, from the accounts we have of these operations, that the disease for which they were performed was really caries of the shoulder, and that the patients retained limbs, which, if not perfect, were at least extremely useful. Notwithstanding this encouragement to extend the practice, it seems to have been afterward treated in this country with entire neglect. In France, Moreau the elder performed the operation successfully in 1786, and the army-surgeons, particularly Barons Percy and Larrey, frequently resorted to it on account of recent gunshot wounds, instead of removing the limb. In civil practice, however, and for the cure of caries, I may say, that excision of the shoulder-joint, until a few years ago, was never mentioned but with ridicule and disapprobation. About five years ago, I met with a case which afforded a very favorable opportunity of reviving this obsolete proposal, and carried it into effect with such success as confirmed me in the opinion of its advantages that I had previously been led to entertain. Before relating the particulars of this case, it will be proper to make some general observations on the mode of performing the operation in this situation.

The humerus is not always affected to the same extent, but the

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* Philosoph. Trans., Vol. lxiv. † Ibid., lxix.

whole of its head, that is to say, all that part above the attachments of the *pectoralis major* and *latissimus dorsi* muscles ought to be taken away; and this should be done in the first instance, to afford room for getting access to the scapular part of the disease. The glenoid cavity is sometimes affected only in a part of its surface, but the whole of it ought to be removed on the general principle already stated. The acromion process, though not entering into the formation of the joint, sometimes participates in the disease, and then, of course, requires removal no less than the other parts concerned. The axillary plexus lies at such a distance below the joint as to be perfectly safe, provided the surgeon opens the articulation at its external or lateral part, and then cuts close to the bones. The only vessel of a size that renders the necessity of a ligature at all probable is the posterior circumflex artery, which may be either tied at the time it is cut, or compressed by an assistant until the operation is finished. The joint may be opened by incisions made in various directions; a single perpendicular one from the acromion will hardly be sufficient, except in such cases as Mr. White's, or in recent gun-shot wounds, where the surrounding parts are not thickened or preternaturally adherent, and where the comminution of the bone renders its free exposure for the application of a saw unnecessary. Mr. Bent made a perpendicular incision, commencing midway between the acromion and coracoid process, and then cut inward or outward the sternum from both extremities of this incision, so as to form an oblong flap of the *pectoralis major* and clavicular portion of the deltoid. It is difficult to conceive a plan of operating more dangerous to the axillary plexus than this one, or less favorable to the easy and effectual attainment of the objects in view. Sabatier proposed to extirpate a portion of the integuments and deltoid of a V shape, which, though, not so objectionable in respect to its danger and inconvenience in the first instance, must be regarded as extremely adverse to a speedy and satisfactory cure. Moreau made a square flap of the deltoid, turned it down, and then gained what more room was required, by cutting upward at both extremities of the transverse incision, so as to obtain another flap. Mr. Morel, in operating on account of a gun-shot wound of the shoulder-joint, six months after it was received at the battle of Waterloo, made a semilunar incision with the convexity downward, so as to form at once a large flap from the deltoid. This mode of procedure does not appear to have been very convenient, if we may judge from what is stated by Mr. Morel as to the length of time required for the operation, which was no less than three-quarters of an hour, and the quantity of blood lost, viz: two pounds.*

I believe that the best way of bringing the bones completely within

* Med. Chirurg. Trans., Vol. vii.

reach, with least injury to the soft parts, is to make a perpendicular incision from the acromion through the middle of the deltoid, nearly to its attachment, and then another shorter one upward and backward, from the lower extremity of the former, so as to divide the external part of the muscle. The flap thus formed being dissected off, the joint will be brought into view, and the capsular ligament, if still remaining, having been divided, the finger of the surgeon may be passed round the head of the bone, so as to feel the attachments of the spinati and subscapular muscles, which can then be readily divided by introducing the scalpel first on the one side, and then on the other. After this the elbow being pulled across the fore part of the chest, the head of the humerus will be protuded, and may then be easily sawn off while grasped in the operator's left hand. The subsequent part of the operation will be conducted on the principles already explained, and as it is of course desirable to preserve as much mobility as possible, no means should be used to restrain motion further than are necessary for preventing irritation and displacement. The *pectoralis major* and *latissimus dorsi* tend to draw the extremity of the bone inward; but this may be easily prevented by placing a cushion in the axilla.

Case I.—Christina Laing, aged thirty-eight, was recommended to my care by Dr. Belfrage, of Slateford. She complained of her left shoulder, the articulation of which was nearly immovable, though the perfect mobility of the scapula rendered this not very obvious. There was a small opening directly under the acromion, about half way between this process and the humeral attachment of the deltoid, and another about the middle of the clavicular part of the *pectoralis major;* both of these openings allowed the probe to pass in the direction of the joint to a considerable depth. The discharge was thin and copious; the integuments were natural; and there was little swelling; the limb was entirely useless, being kept constantly suspended in a sling. The patient stated that she suffered much from pains in the shoulder, shooting down the arm even to the fingers. She was a healthy-looking woman, apparently somewhat exhausted by anxiety and suffering, but had no particular complaint, except what has been described. On inquiring into the history of the disease, I was told that it had commenced six years before, in consequence of a fall on the shoulder from a wall about two feet high. This accident was followed by pain and stiffness of the joint, which gradually incapacitated her for work; and at length, after five years of great suffering, which excited little sympathy, as there was no visible imperfection, she was induced to employ a bone-setter, who used very rough measures, and aggravated her distress. A large abscess pointed on the fore part of the joint, and was opened by a surgeon in this city, to whom she next applied. On

returning home to Roslin after this operation, she caught cold, and was confined to bed for six weeks; another abscess then formed, and opened spontaneously not long before the time I saw her.

From an attentive consideration of all the circumstances which have now been mentioned, I strongly suspected that the bones of the joint were diseased, and that a severe operation would be required for restoring the patient to health; but not seeing any reason for haste, and being averse to proceed rashly, I contented myself with dilating the sinuses, and opening an abcess which had formed in the axilla. Soon after this her health became considerably impaired, and I advised her to return to the country.

I saw nothing of the patient until the beginning of the following March. She then seemed to be much thinner and weaker than formerly, but the joint was little altered, except that there was another sinus just above the posterior margin of the axilla, resulting from an abscess that had been opened in the Royal Infirmary, whence she had been discharged two months before, after a residence of several weeks. She now suffered more than ever from an almost incessant gnawing pain; slept ill; had little appetite; and found herself becoming every day weaker, owing to an exhausting diarrhea.

Though it was still impossible to pass a probe through any of the sinuses to the bone, and though no crepitus could be perceived when the joint was made to undergo the slight degree of motion which it still possessed, I now felt fully satisfied that nothing but an operation afforded any chance of relief, and therefore proposed to cut down upon the joint, so as to ascertain its actual condition; after which the diseased bone might be removed, either alone, if practicable, or together with the limb, if circumstances should render this necessary. The late Dr. Dease, who was then surgeon to the forces in North Britain, having examined the patient, formed the same opinion, and gave me his assistance at the operation, which was performed on the 1st of April.

The patient being seated in a chair, I made a perpendicular incision from the acromion through the middle of the deltoid, nearly to its insertion, by thrusting the knife at once to the bone, and then carrying it downward at the same depth. By introducing my finger into the opening thus made, I felt that the head of the humerus was hollowed into a cavity, and therefore determined to cut it out. With this view, I cut upward and backward from the lower end of the first incision, and having dissected the flap thus formed, so as to expose the joint, detached the scapular muscles from their connections with the tuberosities. When the arm was now carried forward across the chest, I easily made the head of the humerus protrude, grasped it in my left hand, and sawed it off without any injury to the soft parts.

I next examined the glenoid cavity, which seemed to be sound, though divested of its cartilage. The coracoid process appeared to be unaltered; but as the extremity of the acromion was bare and rough, I removed the affected portion by means of the cutting-pliers.

The first incision was followed by a considerable gush of blood; but the only artery divided of such consequence as to require a ligature, was the posterior circumflex, which Dr. Dease compressed with his fingers till the operation was finished. This vessel was then tied. Five or six sutures were introduced to keep the edges of the wound together, and some compresses of lint were secured by a spica bandage.

The whole operation, including the dressing, occupied ten minutes. The patient bore it well, and lost very little blood. She passed a quiet day, and had a good night.

On the second day after the operation, there was a slight attack of erysipelas, for which she had fourteen ounces of blood taken from the arm, and used a weak antimonial mixture.

[Had the patient been put under the influence of tonics before the operation, no erysipelas would have appeared. The abstraction of blood accounts for the alarming sinking to which Mr. Syme presently alludes.—R. S. N.]

On the fourth day the erysipelas was declining. The edges of the wound were generally adhering; but at the site of the old sinus below the acromion, there issued a dark-colored, profuse, and fetid discharge. On the fifth day, there was a sudden and rather alarming sinking of her strength, from which she readily recovered, under the influence of wine and beef-tea. After this the cure went on steadily and rapidly; so that in a few weeks the wound was entirely healed, except those parts of it which corresponded with the openings of the sinuses that previously existed; and she was able to go about free from the former pain, and exhausting discharge of matter. The use of the limb returned gradually, and, though serviceable to her almost from the first, that is to say, a month or two after the operation, it has been gradually becoming more and more so ever since. The sinuses dried up by degrees, and one of them continued to afford a few drops of serous exudation for nearly two years.

She is now in the following state, four years and a half after the operation: Instead of being a thin, exhausted, anxious-looking creature, who seemed about to sink under her sufferings, she is now a stout, active, young-looking woman for her time of life. She manages the whole of her domestic concerns, and performs all the manual offices which the wife of a tradesman is accustomed to do. She sews, knits, and washes. She carries a full pitcher of water, a basket, or any other ordinary load, with the left arm. There is no discharge, pain, or uneasiness of any sort. The left arm is about an inch shorter

than the right; a difference which is best observed when the two arms are viewed from behind, while the elbows are bent; indeed, it can hardly be remarked in any other position. When the shoulder is examined without any covering, it exhibits a very deep, irregular, unseemly cicatrix, owing to the great increase which has taken place in the subcutaneous adipose tissue since the operation.

The joint, if it may so be called, allows the limb to be moved in all directions to nearly the natural extent, but her voluntary command over it is much more limited. She can move it across the chest, both forward and backward, with considerable force and freedom, but she has very little power of abduction; this, however, gives her very little inconvenience, as, when she wishes to separate the arm from the side, she easily does so with the assistance of the left hand. The result of this case far exceeded my expectations, and afforded great encouragement to persevere in the practice.

Case II.—Charles Borthwick, aged forty, a mason by trade, applied to me on account of a disease in the left shoulder, in many respects bearing a strong resemblance to the one that has just been described. There were several sinuses opening about the margin of the axilla and all running toward the joint, though one only allowed a probe to reach the bone; there was little, if any, mobility of the articulation; and there was great wasting of the deltoid muscle, from which circumstance the bones appeared more distinct and larger than usual. The patient's pulse and appetite were good; but he was very thin and exhausted-looking, and suffered from an almost constant cough, which was particularly troublesome at night.

He stated, that between four and five years ago, till which time he had been a remarkably strong and healthy man, he suddenly felt, during the cold weather of winter, a severe pain in the left shoulder, which immediately rendered him incapable of moving the joint. Soon afterward the integuments became red and swelled; and in the course of a year several abscesses formed about the joint, which, when opened, did not heal, but continued to pour out a thin and copious discharge. He had recourse to various practitioners, who prescribed injections and pressure; but as these means were employed without any benefit, he determined to let things take their own course, and had accordingly done so for two years before the time I saw him. During the last six months his strength, which till then had been little affected, began to give way; and at the same time his cough also commenced. An aggravation of the pain, from which he had never been altogether free, induced him to apply to me.

Although I much feared that the period for an effectual operation had been allowed to go by, I felt very unwilling to leave him to the

certain destruction of his complaint, which threatened to be very speedy, and therefore determined to try what effect a change of air and diet would have in restoring his health. With this view I sent him out of town, where he had everything that could be desired in respect to diet and attendance. A remarkable improvement was soon manifest in his appetite, strength, and general appearance. The cough continued, but seemed to depend in a great measure on irritation, as it regularly kept pace with the pain in the shoulder. His respiration was performed naturally, and the stethoscope afforded my friends, who examined his chest by its means, no reason to forbid the operation. In the course of four or five weeks, the patient becoming very anxious for relief, I began to think seriously of operating, and proceeded to do so on the 11th July.

Having brought the head of the bone into view by means of incisions similar to those described in Christina Laing's case, I attempted to detach it from the scapula, but in effecting this, experienced considerable difficulty from ligamentous anchylosis of the joint; the muscles, too, were very rigid, and the long head of the biceps was attached to the humerus, between the tuberosities. Having, at length, divided all the connections, I turned out the head of the bone, and sawed it off. On examining the state of the scapula, where we were prepared to expect disease, I ascertained that the root of the coracoid process, and upper part of the glenoid cavity, were carious. After making a very free removal of the diseased bone by means of cutting-pliers, I secured the posterior circumflex artery, put two stitches in the transverse part of the wound, filled the cavity with caddis, and then fixed the limb with a sling, and a single turn of a roller.

Notwithstanding the pain and tediousness of this operation, which, together with the dressing, lasted twenty minutes, the patient never had a bad symptom, and was walking about at the end of a week. The wound suppurated most favorably, and a great many fragments of bone came away, so as to leave the surface uniformly covered with firm healthy granulations. It is needless to detail particularly the future progress of the case; it may be sufficient to state, that the cavity gradually contracted, and in the course of six weeks was nearly healed. After that time the improvement was not so rapid, and an old sinus which ran along the *fossa supra spinata* under the trapezius rather became larger; I could not, however, discover any diseased bone, and trusted that the progress, though slow, would ultimately terminate in recovery. His pectoral complaints, however, became more troublesome, and he died about six months after the operation, when his lungs were found on dissection to have been almost entirely destroyed by suppuration. The extremity of the humerus was

rounded off and connected to the scapula by strong ligamentous bands.

The result of this case cannot be regarded as unfavorable to the operation; on the contrary, it shows with how little constitutional disturbance excision of the shoulder-joint may be performed even in the most unfavorable circumstances; and there can be little doubt, that, had this patient undergone the operation before the irritation of the disease had effected his lungs, his recovery would have been no less complete than that of Christina Laing.

FIBRO-CARTILAGINOUS TUMOR OF THE HUMERUS.

David Dand, aged forty-five, from Dundee, was admitted into the Royal Infirmary on the 23d of December, on account of a large tumor of the right shoulder. It had a very broad base, which completely filled the axilla, and seemed to grow out from the side of the thorax. The shoulder-joint did not admit of any motion, but the arm moved freely along with the scapula. The head of the humerus seemed to be the center of the swelling, which extended from it in every direction—terminating about half-way from the elbow—and approaching within two inches of the sternum. The clavicle and spine of the scapula could be traced nearly, but not quite, to their junction. The consistence of the tumor was extremely firm, feeling in some parts as if it were composed of bone, and in others of fibro-cartilage. The surface appeared in general pretty equal, but when examined more carefully, was found to be irregularly nodulated. The color of the integuments was not altered. The patient stated that, about six years ago, he began to feel pain occasionally in the shoulder, and six months afterward, first observed on the fore part of the shoulder a swelling, which was firm, and appeared to be seated on the bone. The tumor gradually increased until August, when he sustained a fracture of the affected humerus from falling on his side. The bone was broken about the middle, and united without any displacement. But the morbid growth advanced more rapidly after this injury—and his uneasy sensations kept pace with its progress. He said that what chiefly distressed him latterly was a feeling of weight and oppression, which never ceased—and was particularly severe during the night. He had no other complaint, and seemed to be sound in all other respects.

As the tumor had evidently originated from the humerus, there appeared good ground to believe that the other bones in its neighborhood, though perhaps adhering or absorbed in consequence of its pressure, had not taken on the same diseased action—since the fibro-cartilaginous growth, of which this tumor evidently consisted, is never known to spread its roots beyond the bone in which it originates.

Several of the metacarpal and digital bones are not unfrequently affected together by such swellings; but in these cases they commence independently, and do not *spread* from one to the other. I therefore concluded that Dand's tumor required for its complete extirpation, nothing more than the removal of the humerus, and that, if it should be necessary to take away a part of any other bone, it would be merely to facilitate the separation of the adhesions, which had formed between the surface of the tumor, and the parts on which it rested. It seemed probable that on this account the glenoid cavity of the scapula, the coracoid and acromion processes, and the acromial extremity of the clavicle, might require to be taken away, but in doing so there did not seem reason to anticipate much difficulty or risk of bad consequences. The removal of the tumor was accordingly recommended to the patient, and gladly acceded to him, as he was not only suffering great distress, but had been rendered quite unable to support his family.

The operation was performed on the 5th of January. I commenced by making a semilunar incision on the inner side of the tumor, with its convexity forward, beginning over the acromion process, and terminating at the lower margin of the axilla. The axillary artery was thus brought into view, and tied. I then made a similar incision on the outer side of the tumor, joining the former one, and proceeded to divide the muscles, which were greatly expanded, and apparently much altered in their texture, being of a grayish-yellow color, and of a consistence not unlike that of some malignant growths. These coverings having been divided, the tumor came distinctly into view. With the cutting-pliers, I easily cut through the acromion process and clavicle, and then depressing the arm, separated its remaining attachments. It now appeared that a fibrous anchylosis had existed between the glenoid cavity and the tumor, which had a cup-like form, and embraced the cavity on all sides. I therefore sawed through the neck of the scapula, and removed a portion of the bone, including the coracoid process, which could not have proved in any way useful, and might have delayed recovery. The edges of the wound came very well together. The patient never had any symptom of disturbance, and was dismissed quite well on the 13th of February.

The tumor weighed twelve pounds. I macerated it in expectation of obtaining a specimen of foliated or acicular exostosis similar to some others in my possession, but was disappointed, owing to the large proportion which the fibro-cartilaginous growth bore to the expanded bone, which consequently could not be preserved in one mass, and fell into pieces when deprived of the support it had received from the softer substance.

I heard lately of the patient, who continues well. The most dis-

concerting circumstance encountered in the operation was the alteration of the appearance and consistence of the muscles, which were well calculated to excite doubts as to the extent of the disease. The execution of it, though laborious and formidable, was not difficult, with the exception of the ligature of the axillary artery, which was very tense, owing to its being stretched over the tumor, and was not easily disengaged from the neighboring parts.

I have at present under my care, a gentleman from Yorkshire, who came here to have a tumor of the scapula removed, and I found more difficulty in doing this apparently easy operation, which required merely that the part of the bone below the spine should be taken away, than in performing the seemingly more arduous one which has just been described. It is difficult, indeed, for any person who has not witnessed the excision of the scapula to conceive the embarrassment which proceeds from the quantity of muscular substance that requires division, and the number as well as size of the deep-seated bloodvessels.

This case appears not unworthy of being reprinted on two grounds. In the first place, the tumor, so far as I know, was the largest on record removed from the same situation. In the second volume of the Transactions of the London Medico-Chirurgical Society, there is recorded an amputation at the shoulder, performed by Sir A. Cooper, for the removal of one weighing eleven pounds, which impeded but did not altogether prevent motion of the joint; while in Dand's case the growth weighed twelve pounds, and, being confined to the upper half of the bone, ascended so high as to envelop the glenoid cavity and adhere to it, thus effacing all recognizable distinction between the clavicle, scapula, and humerus.

In the second place, this case affords an instructive illustration of the principle, that non-malignant growths from the osseous texture do not extend their roots beyond the bone in which they originate, provided it is limited by articular cartilage. It was the confidence I placed in this well-ascertained fact that induced me to undertake the operation, notwithstanding the discouraging circumstances that have been mentioned.

EXCISION OF THE ELBOW-JOINT.

Though few surgeons now make the mistake, so frequently committed not many years ago, of confounding caries with necrosis, the former of these diseases still remains in much obscurity and uncertainty, whether we regard its pathology or treatment. It is not my intention at present to write a treatise on this subject, but merely to notice some particulars concerning it, which seem deserving of attention from practitioners.

Caries is generally seated in bones possessing a cellular or open texture, and when it occurs in those of the tabular or cylindrical kind,

it is uniformly preceded by a morbid expansion of the compact structure into a state resembling that which naturally belongs to those where the disease usually resides. Everybody knows that the shafts of bones, and especially the tibia, in consequence of chronic inflammation, are frequently enlarged, thickened, and, at the same time, loosened in their texture, which comes to have nearly the same appearance as that of the spongy articulating extremities. In bones so altered, caries occasionally occurs, or I should rather say, a condition resembling caries, since it differs from this disease in one important feature—viz: *incorrigibleness*. I have hardly ever known this spurious caries resist the local application of blisters, and internal use of oxymuriate of mercury;* and I have felt very uncomfortable in seeing extensive incisions, rasping, trephining, and glowing choffers bristling with actual cauteries, employed ineffectually to cure complaints admitting of such easy remedy.

True caries then may be said, without any exception, to occur always in spongy or cellular bone, and the appearance of the diseased portion is extremely uniform. Surgeons formerly described many different kinds of caries — the dry and the moist, the worm-eaten and the fleshy, etc.; but this variety of description depended on a confusion of caries with other morbid states of the osseous tissue, which ought to have been, as they are now, very carefully distinguished. The carious bone, after maceration, looks as if it had been burnt, being harder, whiter, and more brittle than usual, and there being always more or less excavation, so as to expose the cellular structure, it greatly resembles a piece of loaf-sugar, which has been partially dissolved by momentary immersion in hot water.

It is of much importance to recollect that caries seldom affects the bone to much depth. Thus we often see an articulating extremity carious over its surface, and sound in the center. At other times, we find it hollowed out into a cavity, the inner surface of which is carious, while the external shell is sound. The very limited extent of the disease often contrasts remarkably with the extreme obstinacy and severity of its symptoms. Thus, there is in my possession a thigh bone which I took from the body of a woman who had labored under caries of the trochanter major for thirteen years; yet the whole disease may be covered by the point of a finger, and is not thicker than a sixpence.

Among the characters of caries, we find mentioned a fetid discolored discharge; but any surgeon who trusted to such an indication would be greatly deceived, since, as far as I have seen, the matter can seldom

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* Corrosive sublimate was considered the best antidote for the other preparations of mercury, before the use of iodine was introduced for this purpose.

be distinguished from that which does not proceed from bone, or what is usually called healthy pus.

Caries cannot, like necrosis, be induced directly by the effect of violence. It depends on a peculiar morbid action, which is probably in all cases preceded by inflammation. Many people think that pressure may induce the disease, but they do so erroneously. It is true that pressure, such as that of an aneurism, causes absorption of bone, and gives rise to an appearance which might be mistaken for caries by an inexperienced or careless observer, but could never for a moment impose upon any one acquainted with the distinctive characters of the disease. The surface, exposed by simple absorption, differs in no respect from that which would have appeared if the excavation had been effected by violence. We do not here perceive the hardness, whiteness, and brittleness of caries, neither is there any matter secreted from it; and so soon as the cause is removed, the disease ceases. The effect of pressure in causing absorption without inducing caries, is well seen in those cases of necrosis where internal exfoliation occurs, and the confined pus makes a way for its escape through the cylindrical walls of the bone, since the sides of these passages so produced by absorption, through the effect of pressure, are in no respect carious, or unfit for healthy action. Deep-seated collections of matter ought to be evacuated early, to relieve the patient from pain, or prevent extension of the fluid, but no apprehension need be entertained of caries being produced by its pressure.

Inflammation, as already stated, most generally, if not always, precedes this morbid condition; but it is worthy of recollection, that inflammation, and even suppuration of bone, are not necessarily followed by caries. In cases of compound fracture, amputation, excision of joints, etc., we every day see bones suppurate and granulate in the most satisfactory manner. We observe the same thing occasionally in joints which become anchylosed after being the seat of abscess. There can be no doubt, however, that suppuration of bone, which either takes place spontaneously, or in consequence of slight external injury, is very frequently followed by caries, much more so than when it results from a wound which does not heal by the first intention; the reason of which difference probably is, that bone does not readily either inflame or suppurate, but from violence, except in bad constitutions little able to carry on the process requisite for accomplishing a cure.

Generally speaking, caries occurs in persons of a habit naturally weak or unhealthy, or rendered so by improper modes of life, the suppression of some accustomed secretion, or any other circumstance destructive of the balance of action in the system. Much perplexity has arisen from enumerating among the causes of caries, scurvy, gout, rheumatism, etc. If, instead of this, it had been said that caries is

apt to happen in those disordered states of the constitution which give rise to the symptoms of scurvy, gout, or rheumatism, there would have been no difficulty in understanding the operation of these alleged causes.

The treatment of caries is preventive and remedial. The means of prevention are all those which tend to remove the constitutional defects that lead to the production of the disease, together with the use of those agents which counteract deep-seated inflammation, such as the various counter-irritants, from the actual cautery downward. The actual cautery, though occasionally employed to destroy morbid structures, and suppress hemorrhage, has not hitherto, so far as I know, been used in this country to effect counter-irritation. I have used it extensively on the authority of Rust, who, in his treatise on "Arthrokakologie oder Verrenkungen durch innere Bedingung," affirms the most decided facts in its favor, and I hope that so powerful a remedy will soon come into general use.

Though various external applications were formerly thought capable of altering the morbid action of carious bone, and so effecting a cure, I believe all well-informed practitioners now regard the disease as truly incorrigible, and remediable only by destruction of the part concerned. The question, therefore, comes to be, how can this be best accomplished? The means employed are caustics, cauteries, and excision. The first are little used, owing to their inefficiency. The actual cautery is a more powerful remedy, and has many friends, but may, I think, be objected to on the grounds: 1. That in most cases, it can hardly be applied to all the affected surface. 2. That the extent of its operations is very limited.

Suppose we have to treat a carious joint, where the whole respective surfaces of articulation are diseased, how can the red-hot iron be applied over the whole? and unless it is applied over the whole, how can the disease be cured, since the cautery extends its effects to a very inconsiderable distance? But some may deny this last statement, and certainly with the appearance of reason; since any one would suppose, unless taught by experience to the contrary, that the glowing iron must affect the bone to which it is applied, far and wide, from the part immediately concerned. About ten years ago I saw a surgeon remove an eye, together with a large tumor, from the orbit of a boy aged fourteen, and then apply a succession of full-sized cauteries to the thin orbitary plate of the frontal bone. I expected, that, if the patient did not die from inflammation of the brain or its membranes, the whole thickness of the roof of the orbit must exfoliate. But neither of these events took place; and it was found on dissection, some weeks subsequently, that the bone had been affected to a very slight depth. Having my attention called to the subject by

this circumstance, I took every opportunity of observation, and ultimately satisfied myself, that the actual cautery affects a mere film of the bone to which it is applied.

The only other mode of destroying the bone is by excision, which I am convinced is by far the best, since more can be done by the gouge or cutting-pliers in a few seconds, than by the actual cautery in as many weeks or months. In performing the operation, the surgeon ought to expose the bone very freely, and pursue his excision until he feels that he is cutting in sound bone. It is usual to apply the actual cautery after the diseased bone has been cut away; but this proceeding seems very objectionable. If any carious bone remains, the cautery, for reasons already mentioned, will hardly be able to destroy it, at least another scrape with the gouge would be ten times more effectual; and if it is all taken away, as it may and ought to be, what can be more preposterous than irritating anew a weak bone, thereby exposing it to the danger of a relapse?

When the large joints are carious, it is much better to remove the articulating extremities entire, instead of attempting to cut away the diseased surface piecemeal, which in most cases, indeed, would be impossible.

In performing the excision of joints, it ought to be remembered that caries does not affect the bone deeply; and, therefore, that while the surgeon ought most carefully to avoid leaving any of the diseased *surface*, he should give himself little concern as to the thickness of bone which he removes. I think it the more necessary to make this observation, from seeing that Mr. Crampton cut away four inches of the humerus, which I should certainly conceive was equally unnecessary and injurious. There is always much effusion of new bone for some distance, generally several inches round the carious portion, and the alteration of appearance thus induced is, I know, frequently mistaken for a morbid one. It is no more morbid than the callus which unites a fracture, and ought, therefore, to be carefully distinguished. As already stated, the surface presented by caries is excavated, rough, and spicular, such as would result from burning a cellular bone, and then laying open its internal structure. The surface of effused bone, on the contrary, is compact and warty; it looks as if the ossific matter had exuded in a fluid state and congealed into drops: so that while the carious part resembles a piece of sugar partially *dissolved* by water, the surrounding effusion of new bone has the appearance of sugar partially *melted* by heat.

The excision of joints is usually regarded as a formidable operation, difficult, painful, and dangerous; and, as I observed in relating a case where the shoulder-joint was excised, it is not difficult to discover the source of this apprehension. The slightest wounds of healthy

joints are known to be frequently productive of the greatest mischief, and hence the proposal to cut them out altogether seems equally rash and frightful. But it ought to be recollected, in the first place, that all the structures which excite so much disturbance by their inflammation, are removed when the joint is excised; and, secondly, that in cases requiring excision the natural structure does not exist, being destroyed by the previous disease. Carious joints, therefore, may be cut into with the same impunity as ordinary abscesses, and cut out with no more danger than what attends amputation, or rather not so much, since the balance of action will be less disturbed, *cæteris paribus*, when the limb is allowed to remain. As to the additional trouble and pain which may attend excision, they ought surely not to be reckoned of much importance in consideration of saving a limb.

The difficulties which attend the removal of carious bones from the elbow-joint are considerably greater than those encountered in operating on the shoulder, owing to the number and form of the articulating surfaces and their strong ligamentous connections, while the objection to amputation, so far as regards its danger is of much less weight. The proposal of cutting out the elbow-joint has accordingly proved even still more unpopular than that of excision of the shoulder; and until a few years ago, the only instances on record of its actual performance were those related by Moreau, though their successful issue might have been expected to overcome the prejudices of other surgeons against the operation, and, as it were, force them to adopt it. The original idea of this operation proceeded from Mr. Park, of Liverpool, who tried it on the dead subject, but, for what reason does not appear, never applied it in practice. The two Moreaus, however, adopted it in good earnest, and employed it at Bar-sur-Ornain with great success. Three of their cases are detailed in the treatise of Moreau, junior, and two others are simply mentioned by him, in which the result was equally satisfactory, but the patients being young ladies, the particulars are not related.

Considering the great frequency of caries in the elbow, and the severe operation which is commonly resorted to for its removal, viz: amputation of the arm, the apathy of the profession to these facts seems very extraordinary. During the present century, in which so much has been done toward the improvement of surgery, hardly any attention has been given to this subject; I am not aware, indeed, that the records of our profession contain even a single instance of the operation being performed in Great Britain, previously to the cases which will be found below.

The elbow-joint may require excision for caries, and also for the effects of external injury, both primary and secondary. The part of the articulation that usually suffers most from caries is the olecranon

which is not unfrequently hollowed into a cavity, and diseased throughout; the radius and humerus are in general affected but superficially; and the disease very seldom, if ever, extends beyond the head of the former, and tuberosities of the latter. It is always right to take away the whole of the sigmoid cavity of the ulna, which comprehends the olecranon and coronoid processes, together with the head of the radius and extremity of the humerus as high as its tuberosities. More than this, for the reason just mentioned, need not be removed; and a smaller portion would not include the whole of the cartilaginous surface, none of which, according to the general principle already explained, ought ever to be allowed to remain.

The easiest way of accomplishing this is to remove the olecranon in the first place; then to cut the lateral ligaments of the joint, so as to free the extremity of the humerus, and saw it off; lastly, to detach, by means of cutting-pliers, the head of the radius, and the remaining part of the sigmoid cavity. The reason for not separating at once the whole of the ulna that requires to be removed is, that, in case it is divided below the insertion of the *brachialis internus*, its removal becomes extremely difficult. Having experienced this inconvenience in one of my first cases, I have since always proceeded as has just been described, and never found any difficulty in detaching the coronoid process after gaining the free space that was afforded by removing the olecranon.

A simple longitudinal incision will not give sufficient access to the joint to allow of its excision, even in a sound state of the parts, much less when they are thickened and preternaturally adherent, as in cases of caries. An additional transverse cut was therefore proposed by Mr. Park, intersecting the other at right angles; but this plan labors under the double objection of splitting the triceps, and not permitting free exposure of the humerus. A method still more objectionable, on the ground of unnecessarily injuring the muscles, is to make a longitudinal incision, and two transverse ones at its extremities, so as to form two lateral flaps. By far the best plan that has yet been contrived is that of Moreau; and though it may appear at first sight complicated and destructive to the soft parts, it is really the easiest and least injurious that can be imagined. In making this cut, the ulnar nerve is apt to be wounded or divided; and though the facts mentioned below make this injury appear of very little consequence, as there can be no advantage in inflicting it, the surgeon ought to use the precaution of ascertaining the situation of the nerve before introducing his knife. The thickening of the limb is sometimes not so great as to prevent the nerve from being felt, but more frequently its situation can be discovered only by recollecting its position relatively to the bones; it lies close to the inner edge of the olecranon, and will

certainly be cut if the transverse incision is prolonged farther than this toward the internal tuberosity of the humerus. The surgeon, therefore, ought to feel for the olecranon, and introduce his knife close to its upper surface, with the back turned toward its inner margin, but somewhat nearer its radial side. Having thrust the knife down into the joint, he ought to cut transversely, with a sawing motion, so as to insure the division of the tough tendinous parts, until he arrives at the radial tuberosity of the humerus. He may then make the longitudinal incisions, which should extend about an inch and a-half upward and downward, without any danger whatever, as the oblique course of the nerve recedes from the line of division. Both flaps should be dissected previously to commencing the excision of the bones, as it is thus rendered much easier than when the exposure is confined to the part that is to be first removed. The hemorrhage is generally profuse immediately on the incisions being made, but soon diminishes, and seldom persists to such an extent as to require the application of a ligature; on the principle already stated, however, it is right to secure any vessel, however small, that threatens to continue to bleed. In those rare and perplexing cases, where the ulna is diseased below the coronoid process, and requires to be divided through its shaft, the interosseous artery is very apt to be divided, and must, of course, be tied. As to the humeral artery, it is always perfectly safe, being protected from injury by the whole thickness of the *brachialis internus*.

There is a great variety in the difficulty which is experienced in performing this operation in different cases. The adhesions are sometimes so general and so firm that no way can be made without the knife; while, at other times, the suppuration has, as it were, already dissected the bones, so that the surgeon, after making his incisions, has little to do but to apply his saw and pliers for their removal. When the operation is concluded, the edges of the wound are to be stitched together; the limb ought to be half bent; and a long roller applied in the figure of eight to give it proper support.

In cases of wounds where caries has been induced by the subsequent inflammation, the operation ought to be conducted in the same manner, except that, if there is a large opening into the joint, the incisions ought to be directed so as to take advantage of it.

In recent cases of compound dislocation, and gun-shot wounds of the joint, the surgeon must decide as to the operation to be performed, from a general and attentive consideration of the injury sustained, and the care that can be bestowed on the treatment. Unless there be a wound of the great vessels and nerves, a splintering of the bone high up, a very unfavorable state of the system, or difficulty of procuring the requisite attention, as sometimes happens in military service, he

will be warranted in giving his patient a chance of retaining the limb, by abstracting the broken fragments and removing the articulating surfaces, either through the openings that already exist, or a suitable extension of them.

The best position for the patient in cutting out the elbow, is lying with his face downward on a sofa or table covered with a mattress. It is disagreeable to place him in this posture, which naturally increases his dread of the sufferings he is about to undergo; but no other will enable the surgeon to command the joint so readily.

Case I.—Mr. Y., twenty-four years of age, about fourteen months before asking my assistance, began to feel flying pains in the left elbow-joint. He could not, in any way, account for the origin of this complaint, and paid little attention to it, until after the lapse of several months it became gradually much aggravated, and accompanied by a weakness of the limb, which at length deprived him of its use. The joint being now considerably swelled, was leeched, but without any relief. Poultices were then applied for several weeks, when the practitioner in attendance made an incision over the inner tuberosity of the humerus, and evacuated a large quantity of matter. Other incisions were subsequently made in different parts of the arm for the same purpose. Though somewhat relieved after the discharge of these abscesses, he still continued to be tortured with pain, which was particularly severe during the night, when it not only deprived him of rest, but almost made him distracted.

I saw him first in October, and found his strength, as well as appetite, less impaired than might have been expected. His countenance, however, betrayed intense and long-continued suffering, and exhibited very remarkably that peculiar anxious look which so often accompanies disease of the bones. The limb was perfectly powerless, and œdematous from the lower third of the humerus downward. After several unsuccessful trials, I succeeded in passing a probe into the posterior part of the joint, which was then felt to be extensively carious.

As the disease appeared to be confined to the bones, as the patient was young, and as the irritation of the disease was much greater than any that could result from an operation which had the effect of removing the source of it, I resolved to cut the joint, and accordingly performed the operation on the 3d November, in the presence of Professor Russell and Sir George Ballingall.

Having placed the patient on a sofa, so as to present the elbow in a favorable position, I made a transverse incision at once into the joint immediately above the olecranon, and extending to the radial tuberosity of the humerus, but at such a distance from the inner one as to

avoid the ulnar nerve. I then cut upward and downward for about an inch and a half at each extremity of the first incision, so as to form two square flaps, which being dissected from the subjacent bones, exposed them completely. Having ascertained that the ulna was carious as far as the coronoid process, I sawed it across at this part, and then insulating the extremity of the humerus, divided it in the same way immediately above the tuberosities. I lastly removed the head of the radius, which was very much diseased.

No vessel required a ligature, but there was a considerable general oozing from the cut surface. After exposing the wound for a few minutes, and sponging it with cold water, I brought the flaps together, and retained them in contact by means of one stitch in each of the perpendicular incisions, and three in the transverse one. Some compresses of lint and a roller were then applied, after which the patient was put to bed. Those present were much struck by the very slight alteration that appeared in the shape of the limb after the stitches were introduced.

On the following morning, I found that the patient had passed an indifferent night, and was looking rather anxious and exhausted from want of sleep, notwithstanding an opiate which he had taken the preceding evening. His pulse, however, was good, and he had had no rigor or other unpleasant symptom. As his bowels had not been evacuated the day before, I directed an injection to be administered without delay. In the evening, he was in all respects well; a soft pulse, a clean tongue, and a countenance nearly free from the expression of anxious distress which had characterized it previously to the operation, led me to conclude that there was little reason for apprehension.

Great part of the wound healed by the first intention, leaving very little deformity; but the cure was delayed by an œdematous state of the limb, which distended the newly-formed cicatrix, and impeded the contraction of the granulations in those parts which did not unite in the first instance. To counteract this disposition, I used fomentations with warm salt water, and the pressure of a firmly applied flannel roller. The joint remained movable to the natural extent; but though the patient could use his hand almost from the first, he did not regain any command over the elbow until the end of several months. And even now he does not possess much strength in it. He is able, however, to use it in giving instructions in arithmetic, etc. It may be proper to observe, that this individual is characterized by an extreme degree of what is usually called nervous constitution, and altogether a most unfavorable subject for this or any other operation.

Case II.—A. L., aged eight, in February, fell upon his left elbow, while playing with some other boys. The joint soon afterward became enlarged, stiff, and painful; but not so much so as to excite alarm, until the month of April, when his mother brought him to me for advice. I then found the appearances very unfavorable, the limb being straight and nearly immovable, with much swelling of the joint. The usual measures were employed, but did not prevent the formation of an abscess, which pointed on the outer side of the elbow between the radius and olecranon. I evacuated the matter by incision, and advised that the patient should be taken to the country, as his health had suffered considerably. About the middle of August he returned to town much improved in all respects; his general health being quite restored, and the joint being much more movable as well as diminished in size. Matters continued in pretty much the same state till October, when, finding that the sinus did not heal, I introduced a probe, and ascertained that the olecranon was carious. Having explained the obstinate nature of the complaint, which rendered a spontaneous cure hardly, or rather not at all, to be expected, and the necessity of amputation at some future period almost certain, I readily obtained permission to do what I thought proper for the patient's relief.

On the 20th October, I exposed the olecranon, and by means of cutting-pliers removed a great part of the shell into which it had been expanded; this enabled me to extract some loose pieces which lay within the cavity. Hoping that these might have occasioned the obstinacy of the complaint, I prosecuted the excision no further, and dressed the wound with dry caddis.

The patient made no complaint whatever after the operation. He could not be confined to bed after the first day, and was with difficulty persuaded even to remain at home. The wound assumed a very healthy appearance, and soon contracted to its former size; but then it remained stationary, and the probe discovered that there was still some diseased bone.

Perceiving that another operation was required, I determined to make it an effectual one. On the 27th November, I made a crucial incision, like a St. Andrew's cross, so as to obtain four flaps, which, being reflected, I divided the ulna below its coronoid process with the cutting-pliers, and then removed the detached portion, not without considerable difficulty, owing to its connection with the *brachialis internus*. I next examined the radius, and, finding that the center of its round articular surface was carious, cut off the head with the pliers. I then directed my attention to the humerus, and observing an unsound part in the trochlear hollow, removed the whole articulating surface. Having thus finished the operation, I brought the edges of

the wound together by means of four or five stitches. There was little bleeding, and no occasion for any ligatures.

Very slight disturbance of the constitution followed, but the wound did not unite in any part by the first intention. There was some sloughing of the unhealthy soft parts, and very profuse suppuration, which, however, in the course of a few days, diminished to the usual proportion of a healthy sore. The patient was running about by the end of the first week, and in a fortnight longer the wound was all but healed. It continued to discharge a small quantity of thin serous matter for some months afterward, but at length closed entirely. The mobility of the limb was at first considerable, but gradually diminished, owing, I believe, partly to the increasing contraction and rigidity of the cicatrix, and partly to the willfulness of the patient, who would not exercise the limb as he was instructed to do. The elbow is now nearly stiff; but as the other joints are perfect, and the muscles of the limb retain their full strength, he suffers little inconvenience.

I may remark that this case led me to adopt excision of the elbow-joint. I had been long thinking of this operation, and in 1826, was very anxious to perform it on a boy, whose arm I afterward amputated, as the other gentleman consulted would not sanction my proposal. In the case just related, the disease seemed to be so completely limited to the olecranon, that I expected to remove the diseased bone without encroaching on the joint. This expectation was not realized, but the very slight irritation which followed the imperfect operation I performed with this view, emboldened me to act with more freedom, and happening to meet at this time with the case of Mr. Y., I did not hesitate to perform the complete excision that has been related.

Case III.—Ossory Fitzpatrick, forty years of age, a ship-carpenter from Liverpool, applied to me on the 1st January, on account of an affection of the left elbow, of which he gave the following history: Somewhat more than a year before he began to feel occasional wandering pains about the joint, together with some stiffness in moving it, but was not deprived of the use of the limb until several months afterward, when it swelled, and became excessively painful, with violent disturbance of the whole system. The fever subsided, but the joint remained swelled and painful. An abscess was opened by the knife, and others which formed afterward were evacuated spontaneously, but none of the apertures had closed. On examining the sinuses with a probe, I readily passed it through the joint, grating against carious bones. I proposed excision, and, meeting with the patient's ready consent, performed it a few days afterward.

Having placed him on a table with his face downward, so as to present the elbow conveniently, I made two square flaps, as in the first

case. Finding that the ulna was diseased as far down as the coronoid process, I first sawed off the olecranon, and then cut away what more of the bone required removal with the pliers; this mode of procedure obviated the difficulty occasioned by the attachment of the *brachialis internus*, which I had experienced in the second case. I next detached the head of the radius, which was completely carious, and then sawed off the extremity of the humerus; but, as the disease did not seem to be eradicated at the ulnar tuberosity, I cut away both it and the radial one, so as to leave no room for anxiety or doubt. No ligatures being required, I inserted five or six stitches, so as to keep the cut edges in contact; then applied some folds of caddis; and, lastly, supported the limb by means of a roller. The operation in this case was much more difficult than in either of the former, owing to the extremely firm connection of the soft parts.

The wound healed entirely by the first intention, except a space not larger than one of the original sinuses, and the patient suffered no constitutional disturbance. In two or three days he was walking abroad; and about the end of a fortnight, the cure might be considered complete. Happening to lecture at this time on the subject of caries, I showed him, together with the other patients, to my class, as a proof that the recovery after excision of a joint was not so tedious as had been represented. The mobility of the elbow in flexion, extension, and rotation, was hardly, if at all, impaired; there was no deformity; and he not only retained the full use of his hand, but had regained very considerable voluntary power over the motions of the fore-arm. He left Edinburgh about the end of February suddenly, in bad humor, at my refusing to give him a certificate of the operation he had undergone, which, as it could have been used only for begging, I did not feel inclined to grant. I have neither seen nor heard distinctly of him since; but very vague and contradictory rumors have reached me, from time to time, of his being under treatment in some of the Dublin hospitals, on account of the old complaint. Should this really be the case, I think his relapse might be easily accounted for, by the exposure to which he must have been subjected, in performing so long a journey, at such an inclement season of the year, and so soon after the operation.

Case IV.—Janet Burns, aged twenty-five, from Carnwath, was admitted into the Surgical Hospital on the 8th of May, for caries of the elbow-joint, which had existed for twelve months, and would have been considered amply sufficient to justify amputation. The operation was performed in the manner that has been described, and the after treatment did not differ in any respect that requires to be mentioned. She was harassed by a slight degree of chronic bronchitis,

which delayed her recovery, and rendered the complete and permanent re-establishment of her health somewhat doubtful.

She returned to the hospital last June, on account of a ganglionic affection of her knee, and had then regained the use of her elbow-joint so completely, that, when her hands were used in ordinary employment such as adjusting her dress, sewing, etc., no one would have supposed that it was in any respect defective; and, when she was so engaged, I have repeatedly puzzled strangers, by desiring them to fix on the arm which had been the subject of operation.

Case V.—John Wells, aged nine, was admitted into the Surgical Hospital on the 7th of July, on account of disease in the left elbow, which arose from a fall, and had existed for several months. The limb was considerably swelled about the joint, and there was a sinus which allowed a probe to reach the bone.

The olecranon seemed to be the part chiefly, if not solely, affected; but I resolved to remove the whole articulation, both because some other part of it might be affected, and also because any portion of it allowed to remain might occasion a relapse. After sawing off the extremity of the humerus, and cutting away with the pliers the olecranon and head of the radius, I thought, from the appearance of the different surfaces, that enough had been done, and dressed the wound. When the excised portions were afterward more carefully examined, it was observed that the surface of the olecranon presented a small carious cavity, a portion of which must have been allowed to remain. I immediately undid the dressings, and, by replacing the olecranon, discovered the carious part, which was a sort of cylindrical excavation, no wider than a common quill, but running deeply into the bone. Having ascertained its extent by introducing a probe, I insulated the ulna as far as was necessary, and cut it across through the shaft, so as to detach the whole spongy portion of the bone. In doing this, a large vessel, I suppose the interosseous, was cut and required a ligature.

Notwithstanding the comparative severity of this operation, in which the bone was removed to so great an extent, and the attachments of all the muscles were divided, except that of the biceps, the patient made an excellent recovery, and, being of a most docile disposition, assiduously exercised the limb in performing its different motions. In the course of a few weeks, it became almost as useful to him as ever, and it can now hardly be distinguished from the other; the patient uses them equally for climbing, lifting weights, and wrestling with his companions. When I asked him one day if he knew any difference between them, he replied: "None, except that he could *houk* (Anglicè, *dig*) a hole deeper with the one than the other;" and it was accord-

ingly found, by measurement, that there is nearly an inch of difference between their respective lengths, though this difference is not perceptible except on a careful comparison.

This boy resides in the neighborhood of the hospital, and can be seen at any time by those who are interested in the subject.

Case VI.—Elizabeth Johnston, aged fifteen, from Falkirk, entered the hospital on the 25th August, on account of a disease in the right elbow-joint, which had existed for six months, having commenced spontaneously, and increased progressively, notwithstanding the efforts of her medical attendants. It now presented a most formidable appearance, the joint being so much swelled as to measure thirteen inches in circumference, while the arm above was reduced to little more than skin and bone. The skin over the olecranon was extensively ulcerated, and at different places, both in front and back of the joint, the probe could be passed into sinuses which extended to the bones. The limb was straight, and nearly immovable. The discharge was profuse; the pain unceasing; and the irritation so great, that the patient's strength seemed rapidly sinking. It was plainly necessary to do something effective for her relief; and both Sir George Ballingall and myself, on first examining the case, were of opinion that any operation short of amputation would be inexpedient, where there was such extensive disease, not only of the bones, but also of the soft parts. In the course of ten days, however, whether it was owing to a real improvement proceeding from the free vent which had been afforded to the matter by incisions, or was merely the effect of familiarity with the appearance of the joint, I fancied that it was not so hopeless as we at first believed, and resolved to make an attempt at excision.

The operation was performed in the usual manner, and was attended with very little difficulty, owing to the separation of the surrounding soft parts, which had been caused by collections of matter. The olecranon was greatly expanded, and crumbled into fragments, which were extracted piecemeal; the radius adhered to the humerus, and was taken away along with it. Before dressing the wound, I observed that the ulnar nerve was partially divided by an oblique incision, and, therefore, cut it completely across, to avoid the danger which is usually believed to attend such an injury. The patient did extremely well; the wound healed kindly; the swelling of the joint subsided; and she gradually regained its use. For some time after the operation, she complained of coldness and numbness in the ulnar side of the hand, but, before many weeks, was entirely relieved from these sensations.

She returned home with an arm nearly as movable as ever, and becoming every day more useful to her; and when her father died soon

afterward, leaving a large family in very destitute circumstances, she was able to contribute toward their support by tambouring muslin. In the ensuing spring, in consequence, it was supposed, of having made too great exertions in the occupation just mentioned, she began to complain of pain and swelling in the wrist of the arm which had been subjected to operation. She returned to the hospital in June, and we were then sorry to find a very considerable enlargement of the wrist, with a sinus leading into the carpal extremity of the radius. In these circumstances, there was no resource but amputation, and I, therefore, performed it above the elbow, which could not have been left with any advantage, and, indeed, not without the risk of affording room for more mischief in a limb, and in a constitution that manifested so strong a disposition to diseased action.

We had thus an opportunity of ascertaining the state not only of the newly-formed uniting medium between the bones, but also of the nerve which had been divided. When all the muscles and other parts covering the joint were dissected off, it seemed at first sight as if the articulation still remained, the appearance presented being nearly the same as usual; but on closer examination, it was found that the place of the extremities of the bones was occupied by a mass of strong fibrous substance, closely resembling the ligamentous tissue, which allowed of motion in all directions. The triceps was attached to the posterior surface of this newly-formed ligament, and through means of it to the extremity of the ulna. In respect to the nerve, I am happy to be able to give the following report from my friend, Dr. Sharpey:

"A large oblong swelling, fully an inch and a half in length, enveloped the divided extremities of the nerve, which overlapped each other to some extent. The substance of this swelling was of a grayish color, and exceedingly hard and tough; it was continuous with the sheath of the nerve, and insinuated itself between the nervous bundles, so as to spread them out from one another as they passed through the swelling. The several fasciculi of the nerve could be traced a certain way through the hard matter, both from above and below, without difficulty, as, in the greater part of their course, they adhered to it but slightly, and were distinguished by their yellowish color.

"A few bundles from the lower part of the nerve, but a greater number from the upper, after passing through part of the swelling, terminated on its surface by a free divided extremity which had undergone no thickening, enlargement, nor other apparent change; but it is doubtful whether these cut extremities had been formed by the original section of the nerve, or in cutting out the preparation. Each of the remaining fasciculi, after advancing some way through the enveloping mass, became at length more adherent to it, lighter in color, and augmented in size, expanding into a flattened enlargement, at

which point it was united to one or more bundles from the opposite portion of nerve, and to collateral fasciculi of its own portion, which had undergone a similar enlargement. On minutely examining these points of union, of which there were several, it seemed as if the small cords, or funiculi of the upper and lower divisions of the nerve, were connected together by an intermediate flocculent substance of less than a line in extent, which, when macerated and viewed with the microscope, appeared to be made up of fine filaments crossed and interwoven with one another. At some points, however, I thought I could distinguish parallel filaments, which passed between the upper and lower funiculi, and seemed to establish their continuity by a tissue more analogous to their own; but it is doubtful whether that appearance was not owing merely to a particular cord being continued beyond the point of connection of the rest. When acted on by concentrated nitric acid, the intermediate filamentous matter acquired a deep yellow color, with increased firmness and opacity.

"The nerve had been kept, for some months previous to examination, in a spirituous solution of corrosive sublimate. The upper portion was of a deeper color than the lower, but no other difference could be perceived in the two parts; the appearance of transverse stripes, which nerves usually present, was equally evident in both."

Case VII.—James Page, aged eight, was recommended to the Surgical Hospital by Mr. Ferguson, of Auchtermuchty, as a proper subject for excision of the elbow-joint, and was admitted on the 2d of January. The right elbow was much enlarged, discolored, and stiff. There were two sinuses opening on each side of the triceps, through which a probe could be passed to the bone. The operation was performed, in the ordinary manner, on the 12th of the same month, and he was dismissed on the 12th of March.

This boy was remarkably obstinate and unmindful of the constant injunctions impressed upon him to exercise the joint; it has consequently become very rigid, and therefore impaired the utility of the limb; but that the arm is still of no small advantage to him, will, I trust, appear from the following letter which the Rev. Dr. Taylor was good enough to write in reply to my queries respecting the patient's state after recovery could be considered complete.

Auchtermuchty, *July* 28.

Dear Sir—I am happy to be able to state respecting the boy James Page, on whose elbow you operated in the Surgical Hospital last winter, that his general health is quite good—that his elbow is free from pain, and about the same thickness as the other—that though the wound cicatrized very slowly, it is now, and has been for some

time, perfectly whole—that his use of the *hand* seems to be not the least impaired: and accordingly he employs it, being his right hand, for ordinary purposes which do not require much motion of the elbow-joint—that he seems to have the same strength in the arm operated on as in the other, for when he has anything of considerable weight to carry, for instance, as much water as he can bring in a pitcher, he does it with his right arm—and that, though, as you must be aware from the state in which he left the hospital, he has but very limited motion at the elbow, yet he has a little. He usually puts on and takes off his bonnet, and can also use a spoon with his right hand, but for the latter purpose he generally prefers the left. On the whole, he is certainly in a vastly better situation than if he had lost his arm. I believe that every one who sees him readily acknowledges that. I am, dear sir, yours truly, J. Taylor.

Case VIII.—James Alexander, aged nine, from Arbroath, entered the hospital on the 2d of February, on account of a disease of the elbow, under which he had labored for eighteen months. There was a large opening on the external tuberosity of the humerus, through which the bone could be readily felt, and indeed seen. As there was no prospect of recovery without amputation or excision, I chose the latter operation, and performed it on the 9th of February. It was impossible to cut away the diseased part of the humerus, which was of very considerable extent, without opening the joint. And therefore, in coincidence with the principles so often referred to, I removed all the articulating surfaces.

The patient recovered extremely well and speedily from the operation; but when almost quite well, and just about to be dismissed from the hospital, he fell into a bad state of health, one effect of which was a superficial ulcer over the site of the old opening, that proved extremely obstinate, and yielded only to time, and an alterative course of blue pill and sarsaparilla. He was dismissed cured on the 6th of May. In reply to an inquiry respecting his present state, which I addressed to Dr. Arrott, of Arbroath, I received the following letter from his son:

Arbroath, *Dec.* 17.

My Dear Sir—I called upon James Alexander yesterday, and was much pleased to find his elbow-joint quite sound. Though the motion is a good deal limited, yet the limb is equally strong with the other, and as useful for many purposes. There are several sores on different parts of his body, the same as the one which made its appearance when he was in Edinburgh. Is there anything which you think would be of use to him? His health is otherwise good. I remain, dear sir, most truly yours, William H. Arrott.

Case IX.—John Malloch, aged thirty, from Perth, a missionary of the Baptist persuasion, entered the hospital on the 23d of June, on account of a diseased elbow-joint, of which the following account appears in the Journal:

"His left elbow is very much enlarged, œdematous, and inflamed. There are two sinuses communicating with the joint; one situated immediately over the olecranon, and the other about three inches lower down. There is little pain, except on pressure, when it is very acute. He cannot allow of any motion of the joint, keeps his fingers extended, and seems to be afraid of moving the arm in the slightest degree.

"Seven years ago, he fell upon his left elbow and bruised it; two months afterward it swelled and suppurated; and the discharge continued through several successive openings for two years. It then healed up, but remained swelled and stiff. Last January he was attacked with severe pain in the joint, which increased till five weeks ago, when matter formed, and was discharged by one of the former openings. A fortnight afterward, another abscess collected over the olecranon, and was opened by a surgeon in Perth.

"*June* 25.—Mr. Syme proceeded to cut out the elbow-joint. Running the knife into the joint with its back to the ulnar nerve, he made a transverse incision across the arm, close to the olecranon, as far as the external condyle. From the middle of this incision another was made down the arm over the ulna about three inches in length, and from the extremities of the one first mentioned, two were made up the arm about two inches long. The flaps being dissected back, the articulating extremities of the ulna, humerus, and radius, were removed. The diseased synovial membrane was cut out, and the edges of the wound were then brought together by stitches. Two arteries spouted, but did not seem to require ligatures. The limb was placed in a bent posture enveloped with caddis and a long bandage, to give it support. In this case a longitudinal incision was made downward from the center of the transverse one, instead of two at its extremities, since the sinuses were thus included in the line of incision, and the ulna more readily exposed, which was the bone principally diseased.

"Cloths wet with cold water were applied after the operation, to check the disposition to bleed; but about two o'clock, as there was still a good deal of hemorrhage, the dressings were removed, when it was found to proceed from an artery in the integuments of one of the lower flaps. The bleeding vessel being tied, the dressings were replaced.

"*June* 26.—The wound is looking very well, and seems as if it would heal by the first intention. Pulse quick. Cold lotion to be continued. Tartrate of antimony, with epsom salts, to be taken every hour.

[The patient's pulse was quick, showing irritation, yet he had to take an irritant! Let's notice the result of the case.—R. S. N.]

"*June* 28.—There is a good deal of constitutional irritation. He complains of oppression over the stomach, and a little difficulty of breathing. The wound has not healed.

"*June* 29.—A copious fetid discharge from the elbow, with some redness and tension.

"*June* 30.—Feels much better; swelling subsiding. Acetate of lead lotion, with bandage, to be continued.

"*July* 1.—Appetite much better. To sit up in bed.

"*July* 2.—He was out of bed most of the day.

"*July* 3.—The redness and swelling are quite gone. The edges of the wound to be brought together with adhesive plaster, and sulphate of zinc wash to be applied with bandage.

"*July* 5.—The elbow is looking well, and the wound is granulating kindly. To have steak and a pint of porter.

"*July* 9.—He had rigors yesterday. Elbow appears to be doing very well.

"*July* 15.—The cross incision has almost healed, but the longitudinal one is kept open by the ulna being bare at its extremity, which threatens to exfoliate. A large abscess has formed on his right hip.

"*July* 16.—The abscess was opened and a poultice applied.

"*July* 19.—He has had frequent shivering and sweating fits; pulse quick and weak. To have wine instead of porter. Mr. S. laid open the sinus in the hip, the discharge from which was profuse. Dry caddis and bandage applied. The elbow is improving, the discharge is not nearly so great; and a distinct groove can be felt on the ulna between the dead and living bone.

"*July* 20.—He thinks himself stronger; the rigors are not so frequent. To have sulphate of quina, a grain and a half, three times a day, and a glass of port wine every three hours.

[Had this quina or some more permanent tonic been relied on, the patient would have fared better.—R. S. N.]

"*July* 24.—He had rigors twice yesterday afternoon. About two o'clock this morning, when at stool, there was considerable hemorrhage from the hip. He is weaker than yesterday, and complains of great pain in his right groin, which is a little swelled.

"*July* 25.—He is no better, pain in the groin is still much complained of.

"*July* 26.—His pulse is much weaker, the pain in the groin is excessive; obscure fluctuation can be felt on the iliac side of the vessels.

"*July* 27.—He complains of embarrassment in his breathing, with pain of chest. Pulse 160.

"*July* 29.—He has been slightly delirious; other symptoms as before; he is much weaker.

"*July* 30.—Cold cloths applied to his forehead at his own desire. Pulse can hardly be felt.

"*July* 31.—He died."

On dissection the abscess of the hip was found to extend upward among the muscles, as high as the lumbar region. There was an extensive abscess between the ilium and *iliacus internus* descending into the groin. There were old adhesions between the *pleura pulmonalis* and *costalis* on both sides, but especially on the right. Upon the center of the anterior surface of the left lung lymph had been recently effused to a considerable extent, and about eight ounces of sero-purulent turbid fluid lay in the pleura of the same side. The lungs in several parts were indurated or hepatized, and in some places suppuration had taken place so as to form deposits of the size of a walnut. On the surface of the brain the vessels were more turgid than usual, and in some places there were small ecchymoses. Great part of the wound was healed, but the extremities of both the humerus and ulna were exfoliating.

This unfortunate man, whose thin, emaciated, care-worn appearance indicated an age not less than fifty, though it really was no more than thirty, was certainly, as the result showed, a most unfavorable subject for operation; and I sincerely believe, that any operation, however slight, which had the effect of at all disturbing the constitution, would have given rise to equally disastrous consequences. This extreme tendency to disordered action could of course be learned only when it was too late.

[It should, therefore, be an invariable rule never to operate on such patients until their stock of vitality had been increased by toning up the system. Depletives of all kinds should be avoided.—R. S. N.]

Case X.—William Finlay, aged twenty-three, farm-servant from Cockpen, applied at the Surgical Hospital on the 3d of August, on account of a small abscess a little above the inner tuberosity of the left humerus, with considerable pain, stiffness, and swelling of the joint. This complaint had commenced three months previously, and resisted the usual remedies in such cases.

As the abscess seemed to be quite superficial and devoid of a hard basis, I hoped that it was not connected with the joint any farther than as the effect of irritation there; and that the disease had therefore not advanced to its suppurating stage, and might be still within reach of the actual cautery. I accordingly opened the abscess, and made an eschar between the olecranon and external tuberosity of the humerus. A few days afterward, on examining the sinus, I found that it allowed

a probe to pass to the bones. The patient was dismissed, at his own desire, on the 12th, with directions to go home and apply poultices. He returned on the 26th, and was readmitted.

His arm was now much worse, being greatly swelled and excessively painful. He was entirely deprived of rest, and could not permit the slightest movement of the limb without suffering the most excruciating agony. Several abcesses formed, and were opened after his admission. The acuteness of his symptoms then became somewhat mitigated, and I cut out the joint on the 6th of September.

The only circumstances observed on this occasion that seemed worthy of notice are the following: 1. The great size and strength of the bone, the patient being a tall and powerful man. 2. The state of the cartilage of the humerus, which was almost completely detached, though remaining entire, so that it lay within the cavity like a piece of white leather, the subjacent surface of the bone being covered with a soft vascular growth. 3. The extreme thickness and gelatinous condition of the synovial membrane, which seemed to constitute a great part of the swelling, and of which I thought it right to cut away some large portions.

The patient made an excellent recovery, and was dismissed on the 27th of October. He returned lately so much changed in appearance, that I really did not recognize him at first. The thin, dark, and sunken features were now full and florid, his gait erect, and his appearance altogether that of a man in robust health. His arm is very movable, and daily acquiring more strength, which is already very considerable.

Case XI.—William Rogers, aged thirteen, was brought to me at the beginning of last summer, on account of a diseased elbow, which seemed to admit of relief by excision. The parents were dissuaded from submitting to this proposal by the representation of a practitioner adverse to the operation, who strongly recommended amputation in its stead. As this proposal was still less acceptable than the former, the patient was sent to the country, and placed under the care of an irregular practitioner. I was asked to see him again about the middle of September, and then found that a change had taken place greatly to the worse. The swelling, instead of being circumscribed and confined to the neighborhood of the joint, now extended half way both up to the shoulder, and down to the hand. There were numerous sinuses; and, in short, an appearance of greater derangement of structure than I had ever met with, except in the case of Elizabeth Johnston, above related; but, encouraged by the success experienced in that instance, I still deemed it right to perform the operation.

On the 21st of October, I cut into the joint, and removed the

olecranon as usual. It then appeared that the ulna was very extensively diseased, the cells of its spongy substance being filled with scrofulous matter. To make as sure as possible of taking away all the affected portion, I insulated the bone quite down to the commencement of the narrow part of its shaft, and cut it across there. As the boy Wells, who had an equally large portion of the ulna removed, made perfect recovery, I hoped that the result in this case also would be satisfactory, notwithstanding so great a liberty had been taken with it. For nearly a week this hope promised to be realized. A good deal of inflammation indeed succeeded, but not more than I had frequently seen before. The clots of blood, and sloughs of diseased structure, separated by degrees, and then the swelling and tension subsided. At this stage of the case, I went to the country to perform an operation, and returned the following evening, but did not see the patient till next morning, as I believed him to be doing perfectly well. His appearance then struck me remarkably. He had all along a pale, unhealthy aspect, and quick, uneasy way of breathing; but now his countenance was much more thin, pale and anxious; and his breathing was performed with a sort of catch. He had refused his food both this day and the day before. I believed that the limb should now have been amputated; but previous success made me too confident, and I contented myself with palliating symptoms, of which a very disagreeable one that next appeared was a tympanitic distension of the abdomen. On the 30th of September, he was evidently sinking under the irritation, and I then removed the arm with the advice of some of my friends, but certainly with very little expectation of preventing the fatal termination, which took place the day following.

The result of this case shows that there are limits determined by the extent of the disease, and the constitution of the patient, beyond which the operation cannot be extended with safety. These limits can be ascertained only by experience; and, therefore, such exceptions should be regarded as beacons, not to warn us against the operation, but rather to guide us to its safe and advantageous performance.

Case XII.—John Nimmo, aged twelve, was admitted into the Surgical Hospital on the 1st of October. This boy had been an inmate of the same institution as the other. His complaint had commenced about the same time; and he also had been urgently advised to submit to amputation. The disease was in the left elbow, and presented nearly the same appearance that Rogers' did when I saw him first, which, as already mentioned, was much less formidable than when it was operated on. I performed the excision on the day on which his friend died, since he had come to the hospital for the purpose of undergoing the operation, and would probably have been

discouraged if he had become acquainted with the unfortunate result. Unless my own mind had been well made up as to the advantages of the operation, it would have been no less unpleasant for me to operate than for him to submit. He made a good recovery, though rather difficult to manage in respect to exercising the limb. He was dismissed on the 27th of October; and, as he resides in town, occasionally calls to show us his progress in regaining the use of his arm, which is already very satisfactory.

Case XIII.—John Currie, aged eighteen, was admitted into the Royal Infirmary on the 13th of June last, on account of disease in his left elbow-joint. He stated that, without any assignable cause or perceptible pain, a swelling had commenced about four years before, and that three weeks after noticing it, he had applied to a bone-setter, who treated him very roughly in attempting to reduce a bone which he alleged was dislocated. Though the swelling increased and became very painful in consequence of this treatment, he submitted to its repetition twice a-week for three months; the joint upon each occasion being subjected to the most violent twisting and bending. At last, finding his complaint getting worse and worse, he applied to another bone-setter, who assured him that the bone had not been out of its place, and that he had been the victim of mismanagement. Nothing was then done, and no change worthy of notice occurred until nine months before the time of admission, when a discharge of matter took place spontaneously from the joint. The elbow was much enlarged, and had entirely lost all trace of its proper form; there were several openings from which thin matter issued copiously, and through which a probe could be passed down to carious bone; the patient was much emaciated, and had a very suspicious cough. But as the most careful stethoscopic examination did not detect any evidence of pulmonary disease, it was hoped that relief from the local complaint might restore general health.

On the 28th, I performed the operation in the usual way. The articulating surfaces of the bones were divested of cartilage and carious. They were exposed in succession, and removed by the saw, which I find preferable to the cutting-pliers for this purpose. No bad symptom followed the operation; the wound healed satisfactorily, and the patient very soon began to regain his health; the cough ceased, and the other indications of a phthisical tendency disappeared. He was dismissed on the 14th of August, able to resume his occupation as a "skinner." I saw him lately, and could not have distinguished the imperfect arm, unless my attention had been directed to it.

Case XIV.—Christina Hunter, aged fifty-three, from Kelso, recommended by Dr. F. Douglas, was admitted on the 10th of November.

She stated that for ten years she had complained occasionally of pain in the right elbow, stretching down to the wrist and hand, and gradually becoming more severe as well as frequent. Nine months before the time of her admission, the joint swelled to a great size, and the pain, which was then incessant, suffered so much aggravation by the slightest movement, that she was obliged to keep the limb entirely at rest. An opening was made soon afterward, with the effect of discharging a large quantity of matter, and affording relief from the pain. The disease then remained stationary.

On examination, the elbow was found considerably swelled, and scarcely movable. It could not be extended beyond a right angle, or bent, except very slightly; and the arm was almost powerless. A sinus on the outer side of the joint allowed a probe to enter the articulation. I performed the operation on the 15th of November, cutting out the articulating extremities of all the bones, which were completely carious. The soft parts, being unusually sound, healed very quickly; indeed, almost entirely by the first intention, so that the patient was dismissed quite well on the 18th of December. I heard soon afterward from Dr. Douglas, that on calling to see how she was doing, he had found her knitting stockings, in good health, and free from any uneasiness.

Case XV.—In November, I was asked to see a lady with Dr. Thatcher and Dr. John Brown, on account of disease in the right elbow-joint. She was about forty years of age, very thin and exhausted-looking, with every appearance of speedy sinking after protracted illness. It appeared that she had been suffering severely, for more than two years, from ulceration of the articular cartilages, through which a probe could be passed in different directions into the cancellated texture, and the bones composing the joint admitted freely of lateral movement. It was obvious that the patient could not much longer endure the constant drain upon her strength; but any operation was thought quite out of the question in her weak condition, which seemed so extreme as to render unsafe even any allusion to such a proceeding.

About a month afterward I again saw this lady, and then, with the sanction of her medical friends, ventured to propose removal of the diseased bone. She consented to the operation, which was performed as usual, so as to excise the whole articulating extremities of all the bones composing the joint. She bore it well, and, before the end of another month, was able to employ the hand of the arm affected for knitting. She has since enjoyed perfectly good health, and had an addition to her family.

Case XVI.—James Tainsh, aged eight, from Stirling, was admitted on the 26th of May. He had hurt his elbow by falling on it in the month of December before, since which time the motion of the joint had become gradually impaired, abscesses had formed, and large ulcers opened leading down to the bone. I cut out the joint on the 31st, in the usual way. The patient suffered so little disturbance from the operation, that he could be with difficulty confined to bed; and in two or three days was going about as if nothing had happened. He went home on the 25th of June.

WRIST-JOINT.

The wrist-joint, though not so subject to caries as the elbow, is nevertheless frequently affected with it; and, in such cases, there does not seem to be any other remedy than amputation. The operation of excision is liable here to very strong objections, such as the number and situation of the tendons, nerves, and bloodvessels, which can hardly be avoided; the exposure to injury not only of the tendons for moving the wrist, but also those of the fingers and thumb, the consequence of which would render the hand useless even if it were preserved; the difficulty of eradicating the disease, owing to the number of bones entering into the formation of the joint—viz: the radius, ulna, scaphoid, lunar, and cuneiform; and lastly, the risk of the disease recurring from the inflammation which must necessarily be excited by the operation, in the complicated structure of spongy bones and synovial membranes composing the carpus. In short, excision of the wrist would appear to be difficult of performance, very apt to be followed by relapse, and very likely to leave a stiff, unserviceable limb. It is fair, however, to admit, that these objections are theoretical, and experience may perhaps prove them to be of less importance than they appear before-hand. I, therefore, think it may not be useless to describe what would appear to me the best mode of performing the operation.

Two longitudinal incisions, about an inch and a half in length, should be made from the extremities of the radius and ulna upward, along the lateral aspects of these bones. Two shorter cuts may then be carried inward on the posterior surface of the wrist, from the lower ends of the former ones. The extensors of the thumb will thus, of course, be divided; and great care must be taken to avoid the radial artery where it turns over the end of the radius. The bones, being next exposed as well as possible, ought to be divided with the pliers as high as seems necessary—their removal will then be easily accomplished, after which the carpal part of the articulation may be readily cut away with the pliers and gouge.

Moreau, junior, and Roux have performed this operation, it is said, with good success.

CARIES OF THE CARPUS AND METACARPUS.

From the number and small size of the carpal bones, as well as their intimate connection with each other, and with the extremities of those of the metacarpus, it is extremely difficult to remove the whole extent of caries occurring in this situation; and the disease must, for the reasons already mentioned, be very apt to return. The only cases in which it is prudent to make an attempt of this kind, are those in which the disease is stationary in its progress, where it seems to be of limited extent, and where there is no thickening in the neighborhood, indicative of a disposition to fall into the same morbid state.

When the surgeon determines to operate, he ought to give himself plenty of room, by making a free crucial incision; and having raised the flaps so as to expose the bones, may then, by means of the gouge and pliers, take away the carious portion, which he recognizes by its softness, and want of the toughness which characterizes sound bone. It is generally recommended to conclude the operation by applying the actual cautery; but as its effect on bone is confined to a very slight depth, the surgeon will do well not to trust to this subsidiary means, and rather endeavor to make his excision effectual in the first instance.

CARIES OF THE METACARPO-DIGITAL ARTICULATION.

It is by no means unusual to meet with caries of the first joint of the fingers and thumb; and a humane surgeon naturally feels averse to perform amputation for a disease of such limited extent. But, severe as this practice may appear, it is unquestionably the most prudent, since the shrunk and powerless digit which would remain in the event of a successful excision, so far from affording any compensation for the pain, time, and trouble spent in its preservation, could not fail to be a source of perpetual annoyance to the patient.

EXCISION OF THE JOINTS OF THE INFERIOR EXTREMITIES.

The inferior extremities being employed chiefly in supporting the body, and in effecting progressive motion, can be more satisfactorily replaced by an artificial substitute than the superior. Their joints are large, and consequently require severe operations to remove them; and there is reason, on theoretical grounds, to suspect that the limb which would be saved by this means could hardly be more useful than an artificial one. The objections to the operation, therefore, are greater, while the advantages of it appear to be less considerable than in the superior extremity. It would be wrong, however, to decide hastily against the use of excision in the inferior extremities altogether, the

result of this practice, as applied to the arm, having so much exceeded expectation, and the few instances in which it has been tried in the leg having proved rather favorable to its adoption.

EXCISION OF THE HIP-JOINT.

It has been proposed to cut out the hip-joint on account of caries, and in the case of gun-shot wounds shattering the head of the femur. In respect to the former of these cases, there can be no hesitation in regarding the operation as decidedly improper, since it is well known that the acetabulum is, with hardly any exception, implicated in the disease, and usually suffers from it to a greater extent than the femur. Although, therefore, one out of twenty cases of *morbus coxarius*, admitted of an effectual excision, an operator would certainly not be justified in the general employment of a practice which could be of use so very seldom. If it were possible to ascertain, previously to the performance of the operation, whether or not the patient could be freed by it from his disease, there might be some advantage derived from it; but as this is not the case, prudence and humanity equally forbid excision of the hip-joint.

The inefficacy of surgery in the third stage of the *morbus coxarius* is an additional reason for actively using the means which exert most control over it in the earlier periods of its progress, before the chronic inflammation has terminated in an alteration of structure. Of these unquestionably the most powerful is the actual cautery, and I beg to refer to the Reports of the Surgical Hospital for cases of its good effects in arresting the disease.

It ought to be recollected that the obstinacy of sinuses about the hip is not always owing to disease of the joint, but sometimes depends on exfoliation of the bones of the pelvis, the removal of which is speedily followed by a cure. As this fact has been very much overlooked, I may refer to some cases of it which I have recorded in the ninety-ninth number of the Edinburgh Medical and Surgical Journal.

When the head of the thigh-bone has been broken into pieces by a musket-bullet, without any injury of the great bloodvessels or nerves, or extensive laceration of the muscles, it would certainly be better to extract the fragments than to perform amputation at the joint, as the patient would thus not only retain a limb that might probably be of use to him, but also avoid the shock necessarily attending the removal of so large a portion of the body.

It has been found in trials on the dead subject that a single perpendicular incision, five or six inches long, commencing a little above the *trochanter major*, affords sufficient room for cutting out the head of the bone, where the parts are sound and free from morbid adhesion. The operation would, of course, be accomplished much more easily in

the circumstances under consideration, owing to the comminution of the bone caused by the ball.

EXCISION OF THE KNEE-JOINT.

When the great size of the knee-joint, and consequent severity of the operation which is required for cutting it out, are taken into consideration, there seems reason for surprise that some of the earliest attempts at excision should have been practiced on this joint. It was probably the extreme frequency of amputation for disease in this joint that suggested the attempt at preservation, and forced it on attention more strongly than that of the elbow.

In the year 1781, Mr. Park, of Liverpool, cut out the patella, together with the articulating extremities of the femur and tibia, in the case of Hector M'Caghen, aged thirty-three, on account of caries of ten years standing. He made a crucial incision on the fore part of the knee, and found no difficulty in sawing off the ends of the bones. The patient made a tedious recovery, having repeated attacks of inflammation, and also sustaining an injury of the limb by falling when just beginning to use it about six months after the operation; but at length at the end of a year was dismissed, and subsequently, as Mr. Park expresses it, "got a sound limb, and went to sea." The following extracts are important:

"To the history of Hector M'Caghen I have now to add, that he afterward made several voyages to sea, in which he was able to go aloft with considerable agility, and to perform all the duties of a seaman; that he was twice shipwrecked, and suffered great hardships without feeling any further complaint in that limb; but was at last unfortunately drowned by the oversetting of a flat in the River Mersey." "On the whole, from what I have now seen of this man's limb, I do not hesitate to declare, that it appears to me so much more valuable than any artificial one, that, was I in his situation, I should infinitely prefer the former, at the price which he has obtained it." Mr. Park afterward operated upon another man, aged thirty-eight, who had labored under disease of the knee for three years; but he died of exhaustion about four months after the operation, which seems to have disheartened Mr. Park from making any further attempts to preserve limbs by cutting out the joints. In Great Britian no additional cases of excision of the knee have been put on record previously to those which I am about to relate. In France and Germany there have been one or two attempts of the kind, and a few years ago Mr. Crampton, of Dublin, tried the operation in two cases. The subjects of both were young women, and the disease white-swelling. In one no firm union took place, and the patient died three years and a-half after the operation, exhausted by the discharge and repeated attacks of erysipe-

latous inflammation. The other made a good recovery, so that in "about six months after the operation the femur and tibia were consolidated by a firm bony union, and the woman, though timid beyond all example, began to lay her foot gently to the ground, supporting the weight of her body, however, on crutches. She now went to the country, and in the month of October (fourteen months after the operation), I received a letter from my friend and pupil, Mr. Rynd, of which the following is an extract:

"Your old patient, Anne Lynch, *walked* from Kilcork to Johnston House (a distance of nearly five miles), to see me this morning. She is in excellent health, and the limb is perfectly firm, though bowed outward." Anne Lynch has been frequently in Dublin since that period, and has presented herself for examination at most of the hospitals. She is now in town; and I have this day examined the limb, and find that the femur and tibia are firmly consolidated; the leg and thigh are not in the slightest degree wasted, but the limb is considerably bowed outward. She wears a shoe, with a cork sole four inches thick, and, to use her own expression, "is able to stand or walk the length of a day."*

The objections to excision of the knee-joint seem at first very great, and indeed insurmountable. It may be sufficient to mention the severity and danger of the operation, the tediousness of the cure, and the little difference as to utility between the stiff limb that is preserved and an artificial one. Upon closer examination, these objections, though they do not altogether vanish, certainly appear of less force. Thus the operation requires comparatively small superficial incisions, and can be accomplished much more quickly and easily than excision of the elbow-joint. It certainly must be regarded as more dangerous than amputation when the patient is very weak or exhausted by previous disease; but if he possesses moderate strength, I think it cannot be maintained, either on the general principles already stated, or from the result of experience, that the risk attending it is more than what proceeds from removing the limb. The recovery was certainly very tedious in Mr. Park's case, but there were particular circumstances which, in some measure, account for this; and the few patients who have since then undergone the operation recovered in a shorter time. It ought here to be recollected, too, that though recovery from amputation of the thigh is usually completed in three or four weeks, it is generally *at least as many months* before the patient can rest the weight of his body on the face of the stump, so as to use it in standing or walking. As to the utility of the limb, we find that it can be employed freely in progressive motion, and all the patients have

* Dublin Hospital Reports, Vol. iv.

declared that they considered themselves extremely fortunate in having preserved their legs such as they were. The advantages of the operation, which may be contended for, are, that it preserves the natural support of the body afforded by the bones and joints of the *tarsus*, *metatarsus*, and toes, which, by diffusing the effects of force applied at the extremity of the limb, protects both it and the other parts of the body from concussion; and that it obviates the necessity of resting the whole of the patient's weight on the *face* of a stump, which must be done when amputation is performed above the knee. On the whole, I am not inclined to condemn the excision of the knee-joint altogether; and, at the same time, cannot venture to recommend it, without more facts to ascertain the correctness of our hypothetical opinions on the subject.

The operation may be performed by different external incisions. Mr. Park made a crucial incision, Moreau two longitudinal ones, and another transversely below the patella. The best plan, I think, is to make two semilunar incisions across the fore part of the joint, extending from one lateral ligament to the other, meeting at their extremities, and including the patella between them. Very free room will thus be afforded, which may be easily enlarged, if required, by cutting longitudinally at the point of union of the transverse incisions.

The patient being laid on his back the surgeon should rapidly divide the integuments and other parts exterior to the joint, so as to open its cavity, and remove the patella. Having next cut the lateral ligaments, he may readily protrude the extremity of the femur, and saw off as much as seems necessary. He has lastly, to take away the diseased part of the tibia, which can now be done very easily, by passing the knife round the head of the bone, so as to detach its connections, and then sawing off a slice of the requisite thickness.

During this process, the popliteal vessels may seem to be in danger, but really are not so; as the insulation of the bones is not performed until the ligaments which connect them together are divided, and no longer oppose their being separated from each other, so as to be more distant from the vessels. There is not much bleeding, but one or two of the articular branches may require to be tied. After the operation, a great difficulty has been experienced in bringing the limb into a straight position, owing to the contracted state of the flexor muscles, which still prevent extension, notwithstanding the relaxation that is afforded by shortening the bone. In this case the surgeon must be satisfied with placing the limb on a double inclined plane, in as good a position as can be obtained by moderate force, exerted through the means of pasteboard splints. In a few days it will be found that the tension gradually diminishes, and before long allows the leg to be completely straightened.

During the cure it does not seem proper to insure absolute rest, in order to obtain a true anchylosis or osseous union, since the very long bone that would thus be formed, besides being extremely inconvenient to the patient, by rendering the limb perfectly rigid, could not fail to expose it to a great risk of fracture, by affording long levers to forces acting at the extremities. A great degree of flexibility, on the other hand, would unfit the limb for support and progressive motion, so that, while perfect immobility and free motion ought to be avoided, a slight degree of flexibility ought to be promoted. The chief difficulty of the cure consists in preventing the tendency to bend outward, which is always strong, and, if not counteracted, most injurious to the appearance and usefulness of the limb. The best mode of opposing this distortion consists in the careful application of splints.

Case I.—John Arnot, aged eight, was admitted into the Surgical Hospital on the 1st of December, on account of disease in his left knee. The joint was much enlarged, and bent at an acute angle. There were two sinuses on the inner side, which allowed a probe to reach the bone. The disease had resulted from a fall on the ice, and was of three years standing. His health was broken, and he seemed likely to sink soon under his sufferings unless something was done for his relief.

On the 7th of December, I made two incisions across the fore part of the joint, extending from one condyle of the femur to the other, meeting at their extremities, and including the patella between them. The portion of integuments thus insulated having been removed along with the patella, which was very much diseased, I exposed the extremity of the femur, and sawed it off as high as the tuberosities. In doing this the periosteum was separated from the bone, to which it adhered very slightly, for about half an inch, and I therefore thought it right to saw off another portion to this extent. The head of the tibia was next exposed, and removed by means of the saw and cutting-pliers. One of the articular arteries was then tied, after which I proceeded to dress the wound; but here an unexpected difficulty occurred, owing to the hamstring muscles being so much contracted that they still prevented the limb from being straightened, notwithstanding the relaxation they had undergone in consequence of the removal of the joint. I extended the leg as far as was practicable, and secured it in this position by a splint and bandage.

The patient had very little constitutional disturbance, but the wound presented a dry and unpromising appearance, and the tibia from not resting in opposition to the femur, was drawn upward behind it, so as to make it press upon the integuments and threaten an extensive exfoliation. After several unsuccessful attempts, I at length succeeded, at

the end of several days, in reducing the displaced extremities of the bones, when the limb became quite straight, and the tendency to dislocation almost entirely ceased. The cure afterward went on most satisfactorily, notwithstanding the restlessness of the patient, who did everything in his power to retard it.

In the course of four weeks after the operation, the wound was all but healed, and the limb, before the expiration of three months, had regained so much strength that the patient could make some use of it in walking. It has been progressively improving since, and is still doing well. I have no doubt that ultimately it will be nearly as useful to him as ever; but even at present he would be very sorry to exchange it for a wooden one. He can walk and run, though with a halt, without the constrained appearance of a person with an artificial leg, and merely requires the *heel* of the shoe to be two inches higher than the other. The limb is stout, and well nourished, and though slightly bowed outward, does not occasion any disagreeable deformity; it allows a slight degree of flexion and extension. This boy lives in town, and can be seen by any one who is interested in the subject.

Case II.—Anne Mackintosh, aged seven, a very thin, weak, unhealthy looking child, entered the hospital on the 14th of December, on account of a diseased knee-joint. There was a large sinus over the inner condyle, through which I introduced my finger and felt the joint extensively diseased; there was not much swelling, but the leg was retracted upon the thigh so as to form an acute angle with it. Encouraged by the promising state of the former patient, who seemed a much more unfavorable subject for excision than this one, I performed a similar operation on the 28th of December.

Great difficulty was experienced from the contracted state of the muscles preventing dislocation of the femur, and the surface of this bone, soon after the operation, presented a dry dead-like appearance; but the favorable termination of the former case, notwithstanding a similar and equally threatening aspect, prevented me from abandoning my sanguine expectations of success in this instance also. On the 6th of January, in order to prevent displacement of the bones, which all our efforts had been insufficient to effect completely, I cut away about two inches of the femur with the pliers, and then observed, with much concern, that the bone was denuded beyond the farthest extent to which my finger could reach. The patient began to sink soon afterward, and died on the 8th.

EXCISION OF THE ANKLE-JOINT.

Next to the knee-joint the ankle is the most common seat of white-swelling, and the practicability of its excision is therefore an impro-

tant subject of inquiry. It might be thought that the same objections would apply here as to the wrist-joint, but they hardly do so, at least to an equal extent. Instead of the three carpal bones which are connected with the radius and ulna, there is only one of the tarsus united with the tibia and fibula, viz: the astragalus, and it is of so large a size that the articular surface may be removed without encroaching on its connections with the other tarsal bones; while in the wrist it is impossible to take away any portion of the carpal part of the articulation without opening other joints, and thus laying the foundation of future diseases by exciting inflammation in a structure predisposed to unhealthy action. In the ankle, too, the tendons are less numerous, and the bones are of a larger size, so that more room can be obtained for their removal. But though excision of the ankle may thus be not so objectionable as that of the wrist, it cannot boast of much advantage. The object to be gained being merely a support for the body, it may be questioned how far the foot that remains after the ankle-joint has been cut out is superior for this purpose to an artificial one. It appears from the experience of Moreau, that anchylosis is very apt to ensue after the operation; and though, as he observes, the other joints acquire an unusual degree of mobility, so as to compensate in some measure for the rigidity which is thus caused, there can be no doubt that the elasticity of the foot will be greatly impaired. The limb, too, must be considerably shortened, and the ankle little calculated for bearing the severe strains to which it is exposed. It may be proper to notice also, that a very large proportion of the diseases usually referred to the ankle-joint are seated in the articulation between the astragalus and *os calcis*.

The best mode of performing the operation seems to be that practiced by Moreau. Two incisions, three inches or more in length, are to be made along the posterior edges of the tibia and fibula, from their inferior extremities upward; and then two transverse cuts from the lower ends of these, in a direction forward, as far as the tendon of the *tibialis anticus* on the tibial, and that of the *peroneus tertius* on the fibular side. The flaps thus formed having been raised, the bones of the leg are exposed and divided by means of the saw or pliers as high as may seem necessary, after which the separation of their ligamentous connections is easily effected. The articular surface of the astragalus may lastly be readily removed by the gouge or cutting-pliers.

The limb should be gently moved during the cure, so as to prevent osseous union, since that would prove less convenient than a firm fibrous one, which may in some degree imitate the original joint in diffusing the force of twists or blows sustained by the foot.

CARIES OF THE TARSUS AND METATARSUS.

The spongy osseous tissue composing the tarsus and heads of the metatarsal bones is frequently the seat of caries, and attempts have been made by Mr. Dunn, of Scarborough, Mr. Liston, and others, to cut out the affected portions. Except when the disease is confined to the *os calcis*, so that it may be completely eradicated without opening any of the tarsal articulations, I am sure, so far as I am able to judge from my own experience, as well as the experience of others, that this practice will generally be unsatisfactory. The last case on which I operated, though very extensive, so as to require removal of the whole of the cuboid and part of the neighboring bones, did well; but this must be regarded as an exception from the general rule.

When the *os calcis* alone is affected, the disease may be extirpated by making a crucial incision on the fibular side, and then digging out the carious part with the gouge.

If the disease extends to any of the other tarsal or metatarsal bones, there is hardly any remedy but amputation; and if either the *astragalus* or *os calcis* be affected, of course the whole foot must be removed. It will be well however, to recollect in such cases, that it is neither necessary nor useful to take away so much of the leg as is usually done. If the amputation is performed in a proper manner at or below the middle, so that a good cushion of muscle and integument is left to protect the extremities of the bones, the patient will retain the use of his knee-joint, and be able to stand or walk with an artificial foot, or short wooden pin, much more conveniently than he could do if obliged to support himself by resting on the knee. As the half of the leg is sufficient for this purpose, the surgeon should not amputate lower than this, since, though it may sometimes be possible to obtain a good stump by doing so, it much more frequently happens that, from the soft parts being too scanty in proportion to the size of the bones, these are badly covered.

CHAPTER XIII.

BONES.

FRACTURES.

The osseous tissue resembles, in general, the other vascular parts of the system as to the healthy and morbid actions of its nutritious system; but is remarkably distinguished by its power of reproduction. It is not possible to explain on what this difference depends; but its existence is of great consequence in remedying the accidents to which bones are most exposed by their rigidity—viz: Fracture.

Bones may be fractured in three ways. 1. By external violence operating directly upon the injured part. 2. By external violence causing a strain upon the bone so as to break it, not where the force is applied, but at some other part of its extent. 3. By inordinate action of the muscles. Fractures result most frequently from the first and second of these causes, and very rarely from the third. They occur at all periods of life, but are more frequently met with in particular bones at one age than another. In children, the femur, humerus, and clavicle; in adults, the bones of the leg and fore-arm, the shaft of the femur, the humerus, clavicle, and ribs; and in old people, the neck of the femur, are the bones most liable to be broken. Independently of diseased conditions to be mentioned afterward, which render the bones more subject to fracture, it would appear that the bones of some individuals are more easily broken than those of others. Fractures may be transverse or oblique in respect to the axis of the bone; they may exist at one part of it, or in several, whence they are distinguished into single and comminuted; and they may be attended with a wound exposing the bone, or without one, whence they are divided into Compound and Simple. In explaining the symptoms and treatment of fracture, it is necessary to consider separately the two departments of this last division, which is of great importance.

[Fractures are very often met with in practice, and the surgeon is liable to commit grave errors, unless he is exceedingly cautious in diagnosing the case. Professor Syme, though remarkably clear and concise in his remarks, is perhaps too brief in treating fractures. Upon being called to take charge of a case of fractures, the surgeon should very carefully proceed to determine the character of the fracture. Let him determine certainly that the bone is broken; where at; whether more than one; whether the same bone is broken once or more; whether it be simple or compound fracture; whether it is *com-*

minuted; whether *impacted;* the direction of the fracture; and lastly, the injury done to the neighboring parts. To do all this well and certainly, it is required of the surgeon to be well acquainted with the *varieties* of fracture, and to know them by the indications which have been pointed out by eminent writers. The causes of fracture are exceedingly various, and need not be here enumerated; though the surgeon should ascertain the circumstances of each particular case; for he will be better enabled thus to form some idea not only of the extent, but of the direction and character of the fracture — *e. g.*, we should expect very different fractures in a thigh-bone which had been crushed by a heavy wheel passing over it, and a thigh-bone broken from the kick of a horse. Certain bones are more liable to fractures than others—thus the nasal bones; the radius and clavicle are very liable to be broken; long bones are more liable to fracture than short ones. Again, some parts of bones are more liable to fracture than other parts. The acromion, the olecranon, and the neck of the femur, are especially liable to fracture, in consequence of the insertion of large muscles, etc. The bones of children are more easily injured, but also more readily repaired, than those of old persons. Fractures of children usually occur in the shafts of long bones, and the fractures are mostly simple, and the direction transverse. The bones of old persons are very easily broken, and difficult to again unite. The clavicle, tibia, and neck of the femur, are more liable to accidents in females, while the shafts of the long bones and cranium are more liable to be injured in men. It is thought also that bones are more liable to fracture in winter than in summer. While this is true, it does not depend upon an altered condition of the bone, but because persons are more liable to falls, and because the ground is then harder, being then frozen, and often uneven. In examining a broken bone, or a limb in which a fracture has occurred, we may expect to find the form of the limb more or less changed—*i. e.*, the limb does not seem to lay in its natural position. The motion of the limb is disturbed, though the suspension of voluntary motion does not always immediately follow the fracture, especially if only one of two bones be broken, or if there has been little or no displacement, or if the fractured bone has locked. Crepitation, by which is meant the grating together of the broken ends, may nearly always be recognized, though in case the fracture is simple, and there has been no separation, the crepitation may be difficult of detection. It has been proposed to use a stethoscope in such cases, but it is manifestly useless. Transverse fractures are much easier to unite than oblique ones. They are not attended with shortening of the limb, and are most important when they occur in old persons. Various circumstances may conspire to render union tardy, or to prevent it altogether. Syphilis, scrofula, gout, cancer, etc., or a general ænemic condition, all

tend to retard recovery. When all the conditions are favorable, and the ends of the bone in contact, the ends inflame, and as a result of this inflammation, they are glued together by a gelatinous substance, into which vessels shoot and deposit the phosphate of lime, thus re-establishing the original continuity and functions of the part. If no inflammation arise, no union will occur, and the common practice of reducing inflammation by antiphlogistics, depletion, and water-dressings, is very erroneous. This is not the proper place to enter into a consideration of the philosophy of the process of the osseous reproduction. Much has been said on the subject, and little is certainly known.—R. S. N.]

SIMPLE FRACTURES.

The symptoms of simple fracture are: 1. Distortion or change of shape, owing to the broken bone being unable to counteract the displacing tendency of the surrounding muscles and the weight of the limb itself. There is thus caused shortening or retraction, the extent of which depends upon the obliquity of the fracture, and rotation. 2. Diminution or total loss of voluntary motion. 3. Preternatural mobility by external forces. 4. Swelling from the effusion of blood by ruptured vessels, and from the same cause the discoloration of ecchymosis appearing some time after the accident. 5. Pain and spasmodic starting of the muscles, owing to the irritation of the sharp extremities of the bone. 6. Crepitus, or a grating sensation when the limb is moved, from the rough osseous surfaces rubbing against each other.

When the extremities of a broken bone are allowed to remain at rest they unite together, and if examined by a section afterward, exhibit a mass of new osseous matter which serves as their bond of union. The old surgeons believed that this *callus*, as it was called, resulted from an effusion poured out by the surrounding soft parts, in consequence of the irritation of the injury, which concreted about the broken bones, and so united them together. The great object of treatment, according to their view, was to restrain, by local pressure, the effusion from going beyond due bounds. For this purpose, short splints, or pieces of wood, pasteboard, or iron, were tightly bandaged to the limb over the injured part. Mr. Pott had the merit of exposing to the surgeons of this country the impropriety of such practice, and introducing another more scientific as well as practically useful.

Mr. Pott attributed exuberance of the callus to imperfect adjustment of the broken bones, which causing irregularity and projection of their extremities, consequently rendered their union large and clumsy. He, therefore, insisted upon carefully setting or replacing the fracture, and in doing this pointed out the importance of relaxing, by proper posi-

tion of the limb, those muscles which, by their contraction, caused or increased the distortion. Here he remarked very justly, that what is usually called the riding end of the bone, from its seeming to project, is, with some few exceptions, really in its place, and appears prominent merely because the other is drawn back by the muscles. He showed the folly of attempting to squeeze down the projection by local pressure, and discarded the short splints which were employed for this purpose. But in order to retain the proper position after obtaining it by due relaxation of the muscles, and prevent the weight of the limb, the movements of the patient, and the spasms of the irritated muscles from causing displacement, he recommended the use of splints long enough to extend beyond the joints at both extremities of the broken bone.

The process by which reunion is accomplished can seldom be inspected before its completion, and experiments on the lower animals are not to be regarded as unexceptionable evidence; it has, therefore, been very variously explained, and still remains in some points rather uncertain. The following steps seem to be well ascertained. In the first place, the parts which form the cavity that incloses the fractured extremities of the bone, together with more or less blood, become thickened and consolidated by the interstitial effusion and organization of lymph. The medullary membrane undergoes a somewhat similar change, while the surface of the bone acquires a thin lining of gelatinous-looking lymph. The sort of shell or case which is thus formed by the indurated periosteum, muscles, fat, or whatever other tissue happens to be in the way, gradually becomes firmer, and has ossific matter deposited in its substance, generally in small specks at many different points, but in largest masses where it is connected with the old bone, which is always where the periosteum still adheres to it; so that the portion of bone, from which the periosteum has been torn off at the time of the injury, is inclosed within the capsule. The broken extremities are thus by degrees joined together and rendered immovable, but still remain unable to resist any considerable force which tends to separate them. The process of ossification then proceeds inward from all the surface, both of the old bone and of that newly formed. A gelatinous sort of mass, or sometimes blood, fills the cavity that exists while this is going on, and when the cure is completed, the bone, if divided, exposes a compact

Fig. 30.



osseous mass, which in the course of time acquires a cancellated texture, but has not the medullary canal perfectly restored.

The time required for this process varies with the size of the bone, being performed most quickly when it is smallest, and *vice versa*. The shaft of one of the large bones, such as the femur or tibia, generally acquires rigidity in the course of four or five weeks, but does not regain sufficient strength for supporting the body or performing locomotion until several weeks afterward; and, so far as can be judged from the opportunities of observation occasionally afforded, is not completely ossified at the fractured part before the lapse of several months. The bone here represented had been fractured six weeks before the patient's death from another cause, and *externally* appeared quite reunited, the interstices being filled with a soft friable substance. The age, constitution, and peculiar circumstances of the patient also cause variations in the period of cure. It is most speedy in youth and health. In pregnancy it is performed in general with less energy than usual. Rest of the limb promotes it, and motion not only retards, but if considerable or long-continued, altogether prevents it; in which case the substance that ought to have formed the callus, acquires the appearance and properties of ligament, so as to render the limb flexible, and constitutes what is called an artificial joint, the different kinds and treatment of which will be more particularly considered afterward.

Fig. 31.



In treating fractures, it is of great consequence to set or replace the extremities of the bone as soon as possible after the injury is sustained, and in order to prevent the bad effects of their continued irritation, to effect the adjustment before it is impeded by swelling of the limb or thickening of the parts which surround the bones, and to avoid disturbing the process of reunion by altering the position of the broken surfaces at a later period. When swelling and tension are actually present, it is sometimes thought proper to delay the setting until these symptoms are subdued by leeches and fomentations; but as such means can have little effect while the cause of irritation continues in operation, it is always better to reduce the bones into their proper situation as soon as possible, and then keep the limb steady by means of splints. The best material for splints is thick pasteboard or bend leather, of which the pieces should be long enough to extend beyond both ends of the fractured bones, and broad enough to equal the diameter of the limb. Those of the former kind must be well softened by immersion in hot water, or being thoroughly moistened with it, and

then padded with carded tow, lint, or flannel. The leather ones also require to be moistened, but may then be applied without the intervention of any other material. There are usually required two splints, one for each side of the limb, and the best bandages for retaining them are the looped bandage, the tailed bandage, and the common roller. The first of these consists of narrow strips of calico, about an inch and a half broad, and long enough when folded double to pass round the limb with a few inches of excess; one of the ends is then drawn through the loop and tied to the other. The number of pieces thus applied varies with the length of the limb, as there ought not to be more than three inches between them. This bandage is useful when the degree of tightness requires to be occasionally altered, and the limb cannot be moved without disadvantage. The tailed bandage consists of a common roller, divided into pieces long enough to encircle the limb somewhat obliquely, and cross over far enough to keep their hold. Six, eight, ten, or whatever number of these tails the length of the limb requires, are placed transversely under it, so that each overlaps the one above it about two-thirds. The lowest one is then drawn tightly round the limb, and while its ends are still held by the surgeon or his assistant, the one next above is applied in the same manner, so as to secure the former, and so on until the whole are thus disposed of. This bandage effects a very equable pressure, and can be changed without disturbing the limb; but it does not admit of partial relaxation or tightening. The common roller is the simplest and easiest of all the means for the purpose, but can be used only where the limb may be moved without any inconvenience. There are various contrivances for assisting the splints and bandages in preserving the proper position; but they will be best explained along with the particular circumstances requiring them.

A method of treating fractures has of late years been introduced, from the practice of some Parisian surgeons, very extensively into this country, though there seems great reason to question its superiority over that previously in use. It consists in closely enveloping the injured limb with numerous bands of paper, linen, or cotton, covered with starch, or the modification of it named *dextrine*. Some practitioners apply this immovable apparatus, as it has been called, immediately after the receipt of the injury, but others wait a few days until the tension and engorgement of the limb subside. The great advantage contended for is the abridgment of confinement, since the patient, so soon as the bandages become dry and firm, may quit his bed without danger of displacing the broken surfaces. On the other hand, it may be stated that the process of dressing is not only tedious and requiring great nicety in its execution, but, unless he be carefully watched, must expose the patient to the risk of mortification or other

bad consequences from alterations in the size of the limb occurring subsequently to its adjustment. On the latter account especially, this mode of treatment seems most suitable in hospital practice; and here again, as the patients have no object but a speedy recovery, there does not appear to be any benefit derived from treating them propped up in chairs instead of being allowed to lie quietly in their beds.

[It should be the object of the physician to incumber the limb with as few coverings as possible. The entire object being to keep the ends of the bones in position; whatever may be done beyond this will be manifestly injurious. Above all, let the surgeon not be so rash as to bleed and otherwise reduce the patient, because there is present more or less inflammation. Of course, it is desirable to retard the inflammation until the bone is set, but afterward let it come on as soon as it may, and let it run its course unless it becomes inordinate, which it will not do if the limb is placed under the control of favorable circumstances. Inflammation may supervene from a variety of adverse circumstances, most generally, however, from broken fragments of the bone which are not properly replaced, and which thus become a source of great irritation to the soft parts, and even then inflammation is a normal process for expelling them. It may or may not be interfered with, according to circumstances; remove the cause if possible, or, if not practicable, suppuration may be the best means of relief.—R. S. N.]

COMPOUND FRACTURES.

The wound which constitutes the distinguishing character of compound fractures, occasions a most important difference in respect to the danger, and difficulty of cure attending them. There is apt to be from this source violent inflammation and fever, terminating in profuse suppuration, or gangrene, or death, without any remarkable local change, merely from the effects of violent constitutional disturbance. These consequences used to be ascribed to the admission of air, but are now referred with more reason to the inflammation of an extensive wound implicating important and irritable tissues; for unless the orifice of the cavity heals by the first intention, its surface must necessarily inflame as the first step to granulation. The great object in treating such injuries is consequently to obtain immediate union, and thus convert them into simple fractures.

If the bone projects through the wound, and cannot be readily replaced, a portion ought to be removed from its extremity by the saw or pliers, sufficient for allowing this to be done. To prevent irritation, which is so adverse to adhesion, the bones ought to be carefully set as soon as possible; and to keep down inflammatory action, cloths wet with cold water should be assiduously applied, until there is no longer any fear of it, or until it actually commences. With the same view,

the patient must be depleted according to his strength and confined to the most strict antiphlogistic regimen.

[It is surprising that so eminent a surgeon as Mr. Syme should show such inconsistencies of practice. Here the student is told to deplete his patient, and, in the same paragraph, he tells him to desist from his depleting agents, and employ stimulants. This is what I call double superfluous work. In the first place, some inflammation is necessary; secondly, if it is inordinate, the fomentations are sufficient to reduce it. The cold applications are worse than useless, from the fact that if they do depress, their reaction is stimulative, the very thing that Mr. Syme is endeavoring to avoid. As to the bleeding, the author himself gives a good reason why it should not be performed—viz: "if he survives the immediate danger, he will have to support a copious and profuse suppuration."—R. S. N.]

Should inflammation come on, fomentations and poultices must be substituted for the cold applications. Bleeding is to be used with caution, since the patient, if he survives the immediate danger, will have to support a copious and profuse suppuration; and those means which subdue violent action without permanently weakening the system, ought to be preferred. Of these, the tartrate of antimony, and opiate injections, are the most efficient. So soon as the inflammatory tension begins to subside, the relaxing applications must be changed for those of a stimulating, astringent, and discutient kind. The lotions of acetate of lead, sulphate of zinc, etc., are the best adapted for this purpose.

[There is never any difficulty in controlling inflammation with the veratrum, the gelsemin, or the vapor-bath, all of which I much prefer to the agents named by Mr. Syme. The acetate of lead, nor, indeed, no preparation of lead, is much used among the Eclectics of America. It is a dangerous agent, and has many excellent substitutes.—R. S. N.]

Counter-openings, if required, should be made to afford the matter free vent, and pressure must be carefully effected by compresses and bandages, while the most unceasing attention is bestowed on the preservation of proper position and perfect rest. The patient's strength requires, of course to be supported by nourishing food. Pieces of bone occasionally become detached during the cure, and delay or prevent it—they ought, therefore, to be diligently searched for and extracted.

When the injury is so severe as to preclude the possibility of recovery, amputation must be performed. The circumstances to be taken into account in determining on this proceeding, are: 1. The state of the soft parts; 2. That of the bloodvessels and nerves; 3. That of the bones; and 4. That of the patient's constitution. It is possible that any one of these circumstances may be so unfavorable as

to render the measure in question necessary; but it more frequently happens that the surgeon is influenced by several or all of them in deciding on the operation. In civil practice, it is not requisite to discriminate very accurately on such occasions, since, unless the state of the limb is manifestly so bad as to render recovery impossible, an attempt ought always to be made to save it. For if the bones are carefully replaced, and the means which have been mentioned are employed to prevent and moderate action, both local and general, the patient will not be exposed to much risk in the first instance; and if his strength should prove unequal to the exertion required of it in the future progress of the case, the amputation may be performed with a more favorable prognosis than in secondary amputations after gunshot wounds in military warfare.

[Amputation ought not to be thought of unless it is the only chance to save the patient's life. Very extensive injuries, if well treated, may be cured. The loss of a limb is an irreparable loss, and it ought to be the object of the surgeon to save it if possible. Every surgeon has committed blunders in this respect. Let it be set down as a rule—amputation should be the *very last* resort.—R. S. N.]

PARTICULAR FRACTURES — HANDS AND FEET.

The phalanges of the fingers and toes, owing to their shortness and mobility, are little subject to fracture. The injury, when it does occur, is readily recognized, and easily treated by means of a narrow wooden splint, padded with lint, and supported by a roller. In treating fracture of the proximal phalanx of the fingers, it is difficult to keep the bone straight in the extended position, owing to the effect of the flexors in drawing the broken ends downward, and it will be found more convenient to fill the hollow of the hand with tow, or some other soft material, and then bind down the fingers upon it. The metacarpal and metatarsal bones are more frequently broken when there is little displacement, but considerable swelling, pain and crepitus, with preternatural mobility of the corresponding finger or toe. A compress of tow, supported by a roller, prevents motion of the fractured extremities, which is all that the case requires.

BONES OF THE LEG.

The fibula is apt to be fractured by twists of the foot outward, and usually gives way from about an inch to an inch and a-half above its inferior extremity. The eversion of the foot, and its mobility in a lateral direction, with the pain and crepitus caused by the broken surfaces, render the injury very distinct.

The best mode of treatment is that devised by M. Dupuytren. It consists in placing on the inner side of the leg a thick cushion to

Fig. 32.*



Fig. 33.*



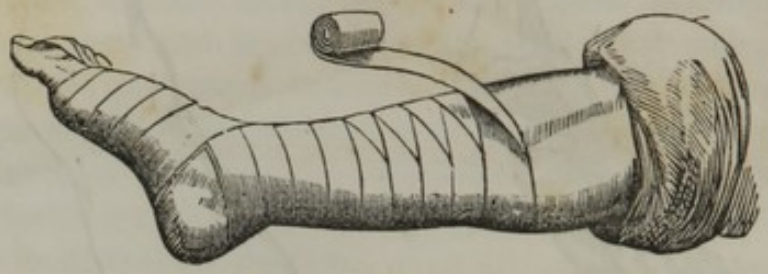
which, after having been secured in its place by means of a roller, a wooden splint, long enough to extend beyond both the foot and knee, is fastened; and then applying a bandage at each extremity of the splint, so as to draw the foot and knee toward it, and thus effectually counteract the distortion which is caused by the weight of the limb, and the action of the peroneal muscles. Sometimes along with this fracture the foot is found displaced, not to the side, but backward, in which case the heel is remarkably elongated and the instep shortened. After the parts have been adjusted by suitable extension and pressure, the same apparatus is to be used, with this difference, that the cushion and splint are placed in front. Dupuytren directed them to be placed behind, but I have not been able to attain the object desired in this way. When the fibula is fractured higher up, the cause is generally direct violence, and the symptoms are so obscure, that, unless the examination be instituted early, before swelling comes on, it is difficult to decide whether the bone is broken or not. The treatment requires merely a roller applied from the toes upward, to prevent motion.

The *tibia* is occasionally fractured, while the fibula remains entire, generally in consequence of strains caused by falling from a height. It gives way most frequently a few inches from the lower end. There is usually not much displacement, but great pain, and complete loss of power over the leg. The treatment is easily conducted, since it

* Fig. 33 represents the position of the foot and external appearance; Fig. 32, the condition of the bones or surgical anatomy of the case.

requires merely the use of means for preventing motion; and a couple of pasteboard or leather splints, secured by the looped bandage, so that they may be relaxed or tightened according to the degree of swelling, will be found sufficient for the purpose, the limb being laid on its outer side, with the knee bent.

Fig, 34.



The *tibia* and *fibula* are very often broken together. The fracture is generally oblique, and seated about the middle, or toward the third of the limb.

Fig. 35.

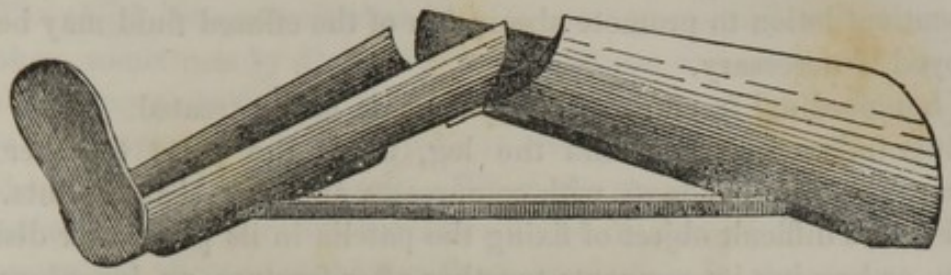


The two bones seldom give way opposite to each other, and frequently do so at the distance of several inches. The accident sometimes results from direct violence, but much more usually is caused by strains on the shafts of the bones, from twists or falls. There being in this case no longer any resistance to the distorting tendency of the weight of the limb, and the retraction of its muscles, there is always much eversion of the foot, and bending of the leg, the upper extremity of the tibia pressing upon the skin, or projecting through it, owing to the lower one being pulled upward and backward by the *gastrocnemii* muscles.

Various methods are followed in treating this common and important fracture. It is evident that the extended position is very objectionable, from not affording any relaxation to the muscles which produce the distortion, and that, therefore, the knee ought always to be bent. This may be done either by simply laying the limb on its outer side, properly supported with splints, or by placing it on a double inclined plane. It will be found, that, owing to peculiarities in the seat and direction of the fracture, the extremities are retained in apposition more easily, sometimes by one of these modes, sometimes by the other. The most convenient inclined plane is that contrived by Mr. Macintyre, of Newcastle, and improved by Mr. Liston.

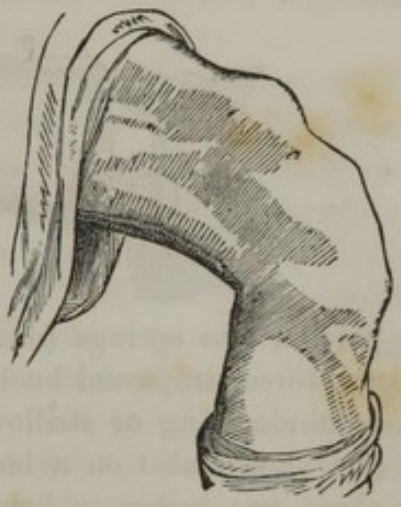
When the fracture occurs very near the knee, the upper fragment becomes subject to the action of the extensors of the knee, and the straight position, consequently, is required to keep the broken surfaces in contact.

Fig. 36.



The *patella* is occasionally fractured, both by the direct effect of external violence, and also, as it appears, by inordinate contraction of the muscles attached to it. In the former case, which is rarer than the other, the fracture is generally comminuted, and sometimes longitudinal. In the latter it is always transverse, and allows the two portions to be widely separated, so that the condyles of the femur can be felt between them. The nature of the accident is consequently very obvious, and is still farther indicated by the complete loss of power over the joint which attends it. When the fracture is longitudinal or comminuted, it is distinguished by pain, mobility of the fragments, and crepitus.

Fig. 37.



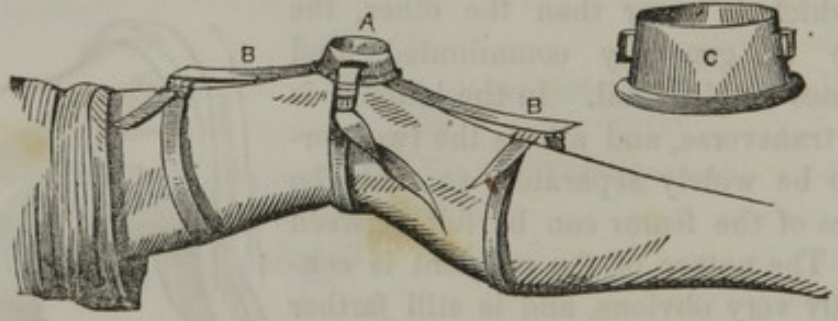
Reunion of the transverse fracture is opposed by the following circumstances: 1. The difficulty of approximating the broken surfaces, and keeping them steady. 2. The presence of the fluid of the joint, which is secreted in increased quantity, owing to the irritation of the injury. 3. The want of vascular parts to afford a bed for the new bone. Osseous union consequently seldom, or almost never, takes place; and there is formed merely a sort of ligamentous connection, varying from a few lines to several inches in extent. The treatment ought always to be conducted, however, as if a complete cure were practicable, so that the flexible medium of connection may be rendered as small as possible. With this view, the limb ought to be laid out not only quite straight, but also somewhat elevated by a pillow, to relax the pelvic extremity of the rectus muscle. A single circular turn of a roller being then applied above, and another below the portions of the bone, the broken surfaces may be drawn very nearly into contact by tying two longitudinal bands introduced under the circular ones, alongside of the

patella. A more effectual apparatus consists of two pieces of leather, three or four inches broad, and long enough to surround the limb, above and below the patella; they are provided with straps and buckles for rendering them tight and drawing them together, and their respective edges are cut out in front to receive the bone. Some discutient lotion to promote absorption of the effused fluid may be employed if necessary.

[Longitudinal fracture of the patella is easily treated. After subduing inflammation, extend the leg, bring the parts together and secure them by bandage, with compresses and pasteboard splints.

For the difficult object of fixing the patella in its place after dislocation, or keeping its segments together after fracture, an ingenious apparatus has been quite recently invented—(represented in the accompanying plate). This consists of a ring or case exactly fitting the

Fig. 38.



patella, two springs (one up the thigh, the other down the shin), and three straps and buckles. The patella case may be described as a tubular ring or shallow *cylinder* (indicated by letter A in the cut, and shown also on a larger scale at c), very slightly funnel shaped, about two inches in height, made of heavy tin, with the lower edge rolled outward, and the inside padded and lined with buckskin. This is exactly fitted over and round the patella, and firmly secured by the strap going twice under the knee, and through the loop or staple on each side. Besides this strap, the curved springs (B B—riveted to the cylinder at opposite points, at right angles to the staples) exert a constant force, tending to press the cylinder down closer, the tendency of the other ends to rise being counteracted by the straps round the leg and thigh. With this apparatus, the patient can even walk about without risk of disturbing the fracture, or allowing the patella to be displaced. It would be safer, however, in any case, to keep the leg at rest and extended for two or three weeks. For this reason a straight splint should also be fastened under the leg and thigh. After this period, the use of the joint could be gradually resumed, the apparatus in front being *worn till the union is complete.**—R. S. N.]

* Eclectic Surgery.

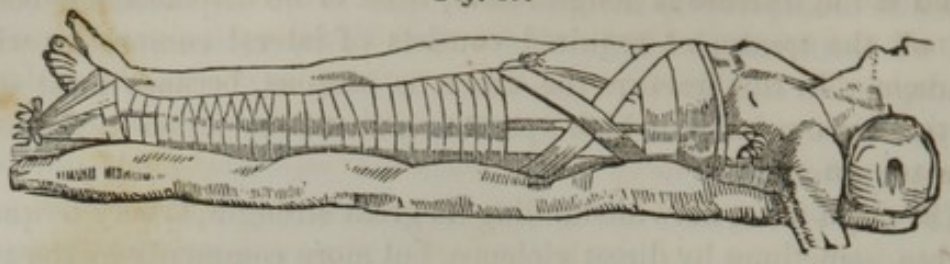
When the fracture is longitudinal, little or no displacement occurs; and all the treatment required consists of lateral compresses with a bandage. In this fracture the union is osseous, because most of the adverse circumstances which operate against bony union in the former case are absent.

The *thigh-bone*, notwithstanding its great strength, is very frequently broken, sometimes by direct violence, but more commonly by the strain which happens in falling, particularly on the side. In adults, it usually gives way at the lower third—in children at or above the middle—and in old people at the neck. When the shaft is broken, the symptoms are those generally characteristic of fracture, and in particular, more or less shortening of the thigh, according to the degree of obliquity of the surfaces of the bones, the lower extremity being almost always drawn up behind the superior one, together with rotation of the foot outward, owing to the weight of the limb. The only cases in which I have found the lower end anterior to the upper one, happened from direct violence.

As the thigh is covered before as well as behind with muscles, which extend beyond both the joints at its extremities, and are nearly equal in strength, it is obvious that no position can have the effect, as in the leg, of relaxing them on one side without stretching them on the other. Various mechanical contrivances, therefore, have been invented for permanently extending the limb, of which the long splint of Desault far surpasses all the others in simplicity and efficiency. It is merely a board about four inches in breadth, long enough to extend from the false ribs a few inches beyond the sole of the foot, and having at each end two holes for the attachment of bandages. The patient's bed having been prepared, by being rendered smooth and firm, his limb is extended until it corresponds in length and direction with the sound one; then a pasteboard splint, properly softened and padded, is applied on the inner side of the thigh, extending from the perineum to beyond the knee, and another on the outer side, reaching from the *trochanter major* as far down as the former. These splints being secured by four or five looped bandages, the board, wrapped in a sheet or tablecloth, of which enough should be left to surround the thigh, is placed alongside the limb, and a handkerchief passed under the perineum, is tied to its upper end, while the foot is secured to the lower one. Retraction is thus effectually prevented; and when the unfolded part of the wrapper which lies under the limb is brought over, and fastened to the splint, a handkerchief at the same time being tied round the patient's body to prevent any lateral displacement of the apparatus, the fracture is rendered perfectly steady.

The plan of treatment recommended by Mr. Pott, which was to lay the limb on its outer side with the knee bent, and merely apply two

Fig. 39.



pasteboard splints to prevent the ends of the bone from moving, is very objectionable. It affords no extension, and renders a permanent eversion of the limb almost unavoidable, owing to the patient turning on his back during the cure, and thus causing the bones to unite in such a manner, so as to produce this effect. The double inclined plane, of various forms and materials, is much used, and has the sanction of high authority. It is alleged to relax the muscles by a bent position of the joints, without occasioning the inconvenience last mentioned, and also to effect extension by the weight of the body, which is, as it were, suspended from the injured thigh. But, as has been already observed, the muscles are equally tense when the joints of both the knee and hip are bent, as when they are extended; and effectual extension could hardly be obtained by suspending the body from the knee, without causing injurious and insufferable pressure on the popliteal vessels. The upper portion of the bone too, must be influenced by every motion of the patient's body, and accordingly the worst cases of retracted and disunited femur are met with in persons treated by means of the inclined plane, by surgeons whose known reputation precludes the objection, that the machine might have been carelessly or unskillfully employed. Even granting that its efficiency were equal to that of the long splint, the simplicity and facility of procuring the latter apparatus would render it preferable. Particular circumstances, however, occasionally occur, which render the inclined plane preferable, such as the existence of a wound, or rigidity of the knee-joint from previous disease, or the advanced age of the patient, which renders the foot unable to bear pressure, or peculiarities in the direction of the broken surfaces, and therefore every surgeon ought to be provided with it.

The thigh-bone is occasionally fractured through one or other of the condyles into the knee-joint, in which case the cure is not only difficult on account of the mobility of the detached portion, but apt to be unsatisfactory, owing to the callus encroaching on the cavity of the joint, so as to impede its motions. The best treatment consists in placing the limb straight, in order that the head of the tibia may by its pressure assist in keeping the condyles even, and applying lateral compresses with a bandage.

The bone is much more often fractured through the trochanters and neck, in consequence, generally, of falls on the side. In persons

beyond the age of sixty, the neck is broken by a slight degree of force, and not unfrequently gives way alone, but it often happens also that the trochanters are split, while the neck remains entire, and is driven into the thick mass of bone at its root like a wedge. The symptoms of fracture in both of these situations are pretty much the same; the limb is shortened from one to two inches, the toes are everted by the weight of the limb, and by the action of the muscles which perform rotation outward, as their attachments to the *trochanter major* remain, while the usual resistance to their operation is removed by the fracture. When rotation is performed, the *trochanter major* may be felt moving as if on its own axis, instead of describing the arc of a circle, as it does when the neck is entire; the shortening of the limb readily yields to moderate extension, and returns when it is discontinued, during which movements an obscure crepitus is sometimes perceived.

It would appear from some cases that if the fracture splits the trochanters, so as to detach the smaller one from the shaft, and also the posterior part of the greater, to which the muscles that perform rotation outward are attached, leaving the anterior portion of the process which receive the insertion of the *glutæus medius* connected with the body of the bone, the eversion of the limb is prevented, and the toes are turned inward, but in other respects the symptoms are the same.

Except in the last mentioned case, which is not common, the discrimination between fracture of the neck alone, and that extending through the trochanters, is not easily accomplished with accuracy. When the patient is not very old, when the shortening of the limb is considerable, and when the trochanter feels, on examination, larger than usual, it may be suspected that the injury is not confined to the neck of the bone. This distinction is of little consequence, except in respect to the prognosis, since the treatment proper for both accidents is the same; but the cure is much more readily accomplished when the fracture is through the trochanters, than when it is confined to the neck. In the latter case, many surgeons in this country believe that osseous union is impossible, unless the reflected ligament, or fibrous covering of the neck, which is continuous with the capsule of the joint, remains entire. There is no doubt that the surfaces of the bones are very apt either to continue quite separate, or to be united by a flexible fibrous medium. But none of the arguments which have been adduced to prove the *impossibility* of osseous junction seem to be conclusive; and though the small extent and mobility of the broken surfaces, the absence of vascular tissues surrounding the fracture, and perhaps also the presence of the synovial fluid, may render the cure very difficult, it ought still to be regarded as a possible occurrence. An attempt, therefore, to unite the fracture ought always to be made, and if it fail, the

patient will at least have no ground to reflect on the careless treatment of his attendant. The long splint affords the most effectual means of preserving the proper position, but has been objected to on the ground that the pressure on the instep of the foot and on the sacrum which its use necessarily occasions, is very apt to cause mortification in the old people who are subject to the accident. Should any indication of this disagreeable effect appear, the limb ought to be immediately freed from all restraint, and simply laid over a large pillow or folded bolster, which will tend to prevent displacement of the fractured surfaces. A fibrous connection will then be gradually formed, with more or less shortening of the thigh, and as strength returns, the patient should, by cold affusion, and gentle exercise, endeavor to regain the use of the limb. In process of time he becomes able to walk with the assistance of a staff and high-heeled shoe. In fracture through the trochanters osseous reunion is certainly and readily accomplished, provided the limb be kept steady in a proper position; and, judging from my own experience, I should say, that the long splint may always be safely employed for this purpose, since it is not necessary to effect any extension, but merely to prevent motion of the limb.

Fig. 40.



[The great variety and complications of fracture of the thigh-bone, render it very necessary to study well the particular kind of fracture present. The great object of the surgeon should be to prevent shortening of the limb, which may usually be accomplished by carefully placing the ends of the bones in exact contact, provided the fracture is not of the impacted kind, or that the body of the bone is not entirely crushed, in either of which cases shortening will assuredly follow. Simple fracture of the shaft of the bone is easily treated, but when the fracture occurs either at or near the neck, or near the lower end of the femur, implicating the condyles, great care and skill are requisite. The fractures of the neck of the femur are usually of the simple kind, (rarely being compound, except from gun-shot wounds), yet owing to the directions of the neck, both perfect position and perfect union are

difficult of attainment. In extra capsular fracture, the difficulty of a perfect cure is very great, and in old persons nearly impossible.

Compound fractures of the shaft of the femur may be very successfully treated without either splints or bandages. The following is the plan: After having raised the foot of the patient's bed to an angle of thirty or thirty-five degrees, place him on it, and fix a pillow under his head, so as to make his position comfortable. Then place the bones in proper position, and fasten the thigh together with a piece of oiled silk, about ten inches or twelve inches wide. The patient's feet are then fastened to the foot-board and the dressing is complete. This plan greatly promotes the escape of the discharge from the suppurating surfaces, and at the same time keeps the limb in a proper state of tension. No motion is allowed. The patient must use a bed-pan for defecation and urination. This mode greatly facilitates the cure, and is much more convenient.—R. S. N.]

Fig. 41.



Of the bones of the *forearm* the radius is most liable to be fractured, and generally gives way about an inch above the wrist. The accident is usually occasioned by falls on the palm of the hand. It is recognized by the ordinary characters of fracture, and is often rendered very obvious by the hand being bent inward, owing to the *pronator radii quadratus* drawing the broken extremities of the bone toward the ulna; or by the distal end of the radius being driven backward so as to make the proximal one project under the integuments of the wrist. When there is little distortion the treatment requires merely

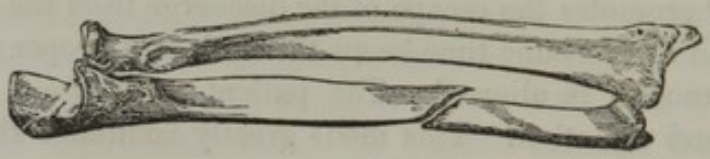
Fig. 42.



the prevention of motion; and this is easily effected by applying a couple of pasteboard splints and a bandage, which may be a simple roller, as it can be readily changed without deranging the fracture. When the hand is inverted, some counteracting power must be employed, and the most effectual method of obtaining it, is to apply a

cushion and splint of wood or iron in the same way as for fractured fibula. The splint ought to be channeled or grooved longitudinally, to insure its steadiness, and at the extremity which is to be placed next the hand, somewhat curved outward, so that when the bandage is applied, the inversion may be perfectly under command. But it is usually found sufficient to apply pasteboard splints long enough to reach from the elbow to the fingers, and thus have such a purchase on the hand as may prevent its inversion by the action of the muscles.

Fig. 43.



The *shaft* of the ulna also is occasionally broken alone, but not nearly so frequently as the radius. The cause is violence acting directly on the injured part. There is generally little displacement; and the treatment is consequently very easy, requiring merely splints and a bandage.

The *olecranon* is sometimes broken away from the shaft of the bone by falls on the elbow. When the tough ligamentous covering of the process remains entire, the fragment suffers no displacement, and its lateral mobility is the only indication of the fracture in addition to the ordinary pain, swelling, and crepitus. But when this fibrous connection is ruptured, the triceps pulls up the detached olecranon to the distance of an inch or more from its proper place. This fracture, in several important respects, resembles that of the patella and neck of the femur; and accordingly, like them, is generally repaired by a fibro-cartilaginous medium instead of bone. With proper care, however, the broken surfaces may be kept so near each other, that no inconvenience is experienced on this account. The treatment obviously requires that the limb should be extended, and this is best done by placing a pasteboard splint on the fore part of the limb, a figure of 8 bandage having been previously applied, so as to retain the fragment in its proper position.

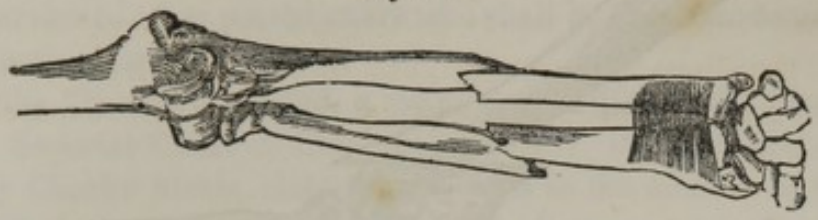
Fig. 44.



Both the bones of the forearm are sometimes broken together, but this is a rare occurrence, and happens either from falls on the hand or blows on the arm. The accident is readily recognized and easily treated, so far as the cure admits of being promoted by external means;

but it is difficult to prevent the bones from approaching each other more or less, and even in some cases uniting together, so as to impede their rotary motion. A couple of pasteboard splints, supported by a

Fig. 45.

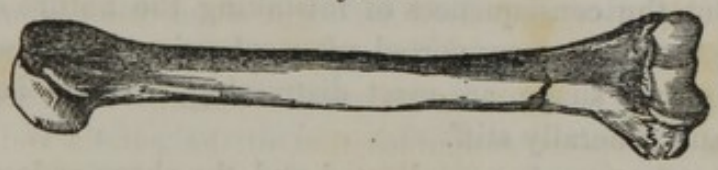


roller, and if the patient is thin, a longitudinal compress, placed between the radius and ulna on both sides of the limb, are all the means that can be employed to prevent such consequences, and preserve the shape of the arm.

The *humerus* is very liable to fracture in almost every part of its extent; and in respect to the diagnosis and treatment, it is necessary to consider the accident as occurring through the shaft—through the neck—and through the condyles.

The *shaft* is broken most frequently about its middle, between the attachments of the deltoid and *brachialis internus* muscles. The fracture is usually transverse, and very readily recognized by the flexibility of the limb at the injured part.

Fig. 46.



It is caused by falls, blows, and inordinate actions of the muscles, as in throwing a stone. The treatment consists in applying pasteboard splints on the inner and outer sides of the arm, extending from the axilla and acromion process to the olecranon, supported by a bandage, which may be a simple roller, or, if there is much swelling, of the looped kind; the elbow ought to be bent at a right angle to relax the muscles equally, and supported in a sling, the patient being kept, if possible, out of bed, to get the advantage of the weight of the limb in effecting extension. When the fracture is seated above the insertion of the deltoid, the lower extremity is apt to be drawn so forcibly upward as not to admit of being secured by the means which have been mentioned. In this case, the patient must lie in bed with the arm separated from the side, so as to relax the deltoid, while it is supported by the splints usually required.

The humerus may be fractured at its lower extremity either obliquely or transversely, so as to detach one or both of its condyles.

Such accidents are generally caused by falls on the hand or elbow and though they not unfrequently occur in adults, are particularly

Fig. 47.



common in children, and very apt to be mistaken for dislocation of the fore-arm backward. It may be distinguished by the deformity disappearing on slight extension, and returning when the limb is left to itself, but is best detected by extending and bending the fore-arm alternately while one hand embraces the elbow. The oblique fracture is easily recognized if the external and internal tuberosities be pressed backward and forward with the two hands. The treatment of this injury is extremely simple, requiring merely compresses of tow before and behind, and a figure of 8 bandage applied while the bones are carefully held in the proper position, the arm being afterward kept in a sling. But the consequences of mistaking the nature of the case, and leaving the limb unsupported after extension has temporarily restored it to proper shape, are most distressing, the arm being always deformed, and generally stiff.

[When the fracture is complicated and the sharp ends of the bone are forced down into and wounding the soft tissues, it is to be regarded as one of the most dangerous of all fractures; and up to the present time the oldest and most experienced surgeons in both Europe and America do not report a single case of perfect cure, where the entire function of the limb was wholly restored. The following case illustrates this very perfectly and establishes some points in medical jurisprudence which cannot be otherwise than of interest to the profession.

Suits to recover damages in cases of alleged mal-practice have greatly multiplied within the last few years; yet patients renew them, notwithstanding the common failure to enrich themselves at the expense of the surgeon. The experience of those who have made such attempts have been altogether inadequate to satisfy the morbid desire to collect damages from practitioners, and legal gentlemen as readily advise the institution of suits as though it had been held by the civil code, that the surgeon warranted, in every case, to restore a limb or joint to its normal condition. Every practitioner, and especially

every surgeon, is deeply interested in such medico-legal questions, and each does only a duty to the profession when he reports in full, such cases as may come under his knowledge. The case in question is one of considerable interest, as well as importance, and the decision may be of service to other practitioners who shall be the defendants in future mal-practice cases.

On the 7th of July, 1856, a petition was filed in the Clerk's Office of the Superior Court of Cincinnati, by Mrs. Maria Steele, mother of the boy Charles Steele, claiming damages to the amount of $3,000, to which Professor Newton replied. As the facts appear in the testimony, the petitions are omitted.

The boy, Charles M. Steele, appears to be about fourteen years of age, with a fair constitution of the sanguine lymphatic class. As he appeared in court there was nothing remarkable about him, except his left arm, and this would not have been noticed, unless attention had been called to it. The cuff of the coat sleeve hid very nearly the hand which, if seen, would hardly have fixed attention, as the contraction of the fingers was not so great as to close the hand more than is customary with those who walk with the hands swinging by the side. When stripped for inspection it was found that the motion of the elbow-joint was as perfect as in the sound arm. There was a visible decrease in the muscles of the fore-arm, and partial contraction of the fingers. He stated that the sensibility of the arm was so much impaired, that he sometimes scratched his hand so as to make it bleed, without being aware of the injury. The arm was minutely examined by several surgeons, who had been summoned, as experts, to testify in the case. We will give a brief exhibition of the material evidence.

Professor R. D. Mussey called—Testified that he had practiced medicine and surgery for more than fifty years. He had examined the boy's arm, and found it withered, and the general sensibility much impaired—results arising from diminished innervation. He should infer that the bloodvessels had been too much constricted by the bandages, thus obstructing the proper circulation of the blood in the limb. Cannot say that this was positively the case. These results might have been induced by injury to the median nerve, but thinks the circulation was obstructed, and in consequence the blisters appeared. Fractures in the lower end of the humerus are very difficult to treat, and for which there is a variety of plans. He should have kept the fore-arm flexed on the upper-arm, at a right angle, and have been careful not to dress it too tightly. He should use some sort of a splint, though he could not at present specify the exact kind. Some surgeons, in dressing such fractures, leave the hand bent, while other straighten it. He was of opinion that, if a fracture had existed in the case, it was probably an oblique fracture, including the internal condyle. The

elbow-joint is now in good condition, having its natural motions in all directions. He has not, however, seen similar results from such a fracture. The ulnar nerve, as well as the median, may have been injured.

Cross-examined—He was not positive as to the direction of the fracture, nor was it always easy to judge so as to form a positive opinion. All fractures of the os humeri, running into the elbow-joint, are difficult of cure. He was of opinion that a permanent injury, or a degree of deformity, is sustained in a majority of cases. The vesications in this case may be accounted for by the injury done to the nerves, but thinks that tight bandages are oftener the causes of such results. Different surgeons adopt different plans of treatment. He knew an eminent surgeon in Kentucky who did not use splints at all, in cases of fracture, but he was of the opinion that the best surgeons, at the present time, employ splints.

He has seen cases similar to this—had seen a case, some years ago, where the fore-arm mortified in consequence of having been too tightly bandaged. Thinks that in this case the dressings may have been too tight. He was of the opinion that partial paralysis might be induced by too tight dressing, without gangrene necessarily ensuing. (Prof. Mussey here cited a case in which a permanently enfeebled and withered arm was caused by dressings for a broken collar bone, in which the arm was bound too tight upon a compress placed between it and the body; this occurred without vesication or gangrene. Erysipelas may follow such injuries, exhibiting itself in from twenty-four to seventy-two hours.)

Re-examined—He was of the opinion that the injury in *this* case is permanent; the fingers can be straightened by an operation, but without any special benefit to the boy.

Professor Jesse Judkins called—Testifies that he is a physician and surgeon, and has practiced his profession for eighteen years, a part of the time as a teacher of anatomy and physiology. He did not hear the boy testify, but he had examined the condition of the arm. If there has been a fracture of the arm the reparation has been most complete. The wasting or withering may be a result of muscular changes or of nervous sympathy. He was of the opinion that the inflammation had been very intense. The capillary circulation may have been arrested by too tight bandages, the result of which would have been inflammation, erysipelas and gangrene. When the arm was so very offensive, there must have been some degree of gangrene. The blisters showed intense inflammation. He was of the opinion that the arm may yet improve. The union of fractures in young persons may be very complete. Thinks that in such a fracture, the arm should be flexed to right angles when set. Injuries of the elbow-joint are always attended

with complications, the nature of which cannot be always easily determined. He could not say from the present condition, what had been the exact nature of the complications in this case. Tight bandages tend to prevent a return of blood from the extremities back to the heart. The erysipelas complained of was, in all probability, induced by too tight bandages. Gangrenous states of a part are always offensive after sloughing has commenced. The surgeon should see such a patient at intervals ranging from two days to one week. Thought it would be imprudent to send such a patient away from his office without examining the state of the arm. The nurse, however, must attend to the dressing.

Cross-examined—He thinks this patient was seen often enough. A simple fracture would require less attention. Does not think that the injury of the median nerve alone caused the difficulty here presented, though it may have been the primary cause; the muscles and ligaments might also have been injured, and thus have assisted in securing the present results. Thinks the bandages might have caused the erysipelas. When called to such a case, the bones must be put in position; the arm being flexed to right angles; the splints to be adjusted, and the bandages to be applied. The bandages cannot be put on tight enough to paralyze, without producing gangrene. The median nerve at this point (entrance of the end of the fractured bone in its downward descent), is deeply seated. The offensive odor of such cases may precede true gangrene. It will, however, be recognized as the peculiar odor accompanying erysipelas, and which is unlike that of gangrene. Simple vesication would give both a discharge and an odor. The difficulty of effecting a cure in such a case will depend on the amount of the tissues which have been destroyed or injured. He thought that a majority of fractures of the elbow-joint were completely cured. He could not say whether, in this case, it was the muscles or nerves that were injured, but thinks the muscles sustained most damage. When elbow-joint fractures are complicated, then he thought that a majority were not cured completely. Thinks that the end of the fractured bone was here thrust forward into the tissues of the anterior superior forearm.

Professor T. Wood called—Testified that he was a practicing surgeon and now holds a professorship of anatomy. He had heard a part of the boy's testimony. He thinks the present condition of the arm is the result of bandages too tightly applied. He could not discover evidence of there having been a fracture, and if there had been, he had never met with a case where the cure was so perfect as in this case. The median nerve did not supply all the fingers. He had never met with such a result as this, except it had arisen from bandages too tightly applied. He never knew erysipelas to occur as the result of

such injuries, where no external opening had been made at the seat of the fracture. Gangrene may, and sometimes does, occur without erysipelas. In this case, he thinks there has been extensive inflammation, and that the muscles have grown together. He was in the habit of examining similar cases once in every twenty-four hours, to see that all things were well, for a period of one week. He thought the purple color of the hand arose from compression; the blistering being one of the first results of such compression. He uses for such fractures the angular splints, but pasteboards may be used. He always steadied the hand in dressing, and generally leaves it straight. The contractions in his arm do not result as a necessity from tight bandages. The contractions usually come on after the parts have been healed up. The chief reason for preferring long splints is to prevent motion of the parts. He had never seen blisters occur unaccompanied by compression. He had seen two similar cases the past summer. He thought that before the muscles of the fore-arm could be materially injured by the end of the bone, the artery would have been cut off. Erysipelas may occur from very slight wounds; often a simple scratch of a pin on the arm will induce it; so, too, may fractures and tight bandages. Short splints only serve to keep the parts together. Paralysis may be induced without gangrene, provided the pressure be continued for a great length of time. No injuries of the elbow-joint are so completely cured as to leave no trace of them. He did not find satisfactory evidence that the bone had been broken. He had known wasting of the arm to occur where the bone had sustained no injury. Paralysis generally results from injury to the nervous centers.

Prof. G. C. Blackman called—Testifies that he is the Professor of Surgery in the Ohio Medical College, and Surgeon to the Commercial Hospital. He had both examined the boy's arm and heard his statement, but from those sources had formed no positive opinion. The paralysis may be the result of the shock sustained at the time of the accident, or it may be the result of too tight bandaging, or from having retained the arm too long in one position. The blisters common to such fractures may follow in less than twenty-four hours where there is no dressing, and may be the result of the violence done to the soft parts at the time of the injury. If erysipelas was, at the time, epidemic, it would almost certainly follow as one of the phases of such a case as the one under consideration, or even a less injury. He had no positive proof that the arm had been fractured, but he thought there had been a fracture of the humerus involving the inner condyle and injuring the ulnar nerve. These are bad fractures, and their true character is difficult to detect. He thought the ends of the bones should have been put together immediately, inflammation or not. He had seen discolorations of soft parts where the ends of the bones had done violence to

the soft tissues. The bandages in such oblique fractures must be tied rather tightly, and the surgeon in setting the arm may use either the wooden splints or pasteboards. In setting the arm he prefers to steady the hand. He had known mortification occur in twenty-four hours from tight bandages. The blisters may have been the result of such bandages; he would not attach much importance to the tightness of the bandage, unless tight enough to induce excessive inflammation. It was not customary to change the bandages oftener than once in twenty-four hours.

Cross-examined—He thought the tissues of the joint had been injured, and the results in this case may depend on such injury, and not on tight bandages. Children are very apt to complain of the tightness of the bandage, even when it is not too tight—could not say that the bandages in the case of this boy had been too tight; the symptoms of the case do not prove that they were too tight. The paralysis and wasting may depend on other causes, and he was not willing to say that such had not been the case. In such fractures it is a very common result to have impaired motion. The experience of the oldest and ablest surgeons in both Europe and America show this to be the case. Professor Hamilton, of Buffalo, shows that a majority of such cases are attended with permanent injury of some sort, and all authors on the subject testify that an impaired condition results in a large majority, if not in all cases. He thinks that there was enough care shown by the surgeon in the treatment of this case. Conditions might arise which would cause him to remove the bandages entirely, as severe pain, inflammation, etc. The fracture should be kept *in situ* by bandages if possible, as the redisplacement of the ends would cause danger to the arm, for the point of the bone would be again thrust down into the soft parts, and get up a worse condition than ever.

Re-examined—He had seen several cases similar to this, and these too had been under the care of the best surgeons. Indeed he had some in his own practice. He considered the repair in this case very perfect; he considered it a fine sample of union, and he had seen greater paralysis arise from less injuries.

Professor R. S. Newton called—Testified that he had been a practicing surgeon since 1841—fifteen years. Was now a Professor in the Eclectic Medical Institute, and surgeon to Newton's Clinic Institute. On the day set forth in the declaration, he was called by Mr. Hunter, and found the boy, Steele, with his arm broken. He thought it a bad fracture, and asked Mr. Hunter who had sent for him. Mr. Hunter replied, that he had come of his own accord, as he worked in the same office with the boy. He then told Mr. Hunter that he would rather not take the case. On examination, he had found the humerus broken off obliquely, the end of the bone driven down into

the hollow of the arm; the boy, at the same time, suffering very much. He could distinctly feel the end of the bone. The arm could not be straightened. He had experienced but little difficulty in setting it, but it was not so easy to keep it in proper position, there being a constant tendency to slip down; hence, to prevent this, the bandages had to be applied firmly. The arm was much swollen at the joint, and all the bloodvessels of the arm seemed to be engorged, though not more than an hour had elapsed since the accident. The boy was crying when he went in, and exhibited more suffering than from a simple fracture. In such cases, most of the pain arises from injuries to the muscles, though some of the pain is to be attributed to the fractured bone itself. He first drew the point of the bones together and then bandaged the arm from the hand up, afterward applying the splints, leaving the arm flexed to right angles. The splints are applied to prevent rotary motion. In this case more pressure was needed than in a simple transverse fracture, on account of its obliquity. The bandage was not tighter than he thought necessary. He had remarked to the boy, and those present at the time it was set, that the arm might be anchylosed, or that mortification might supervene. He had completed the dressing by two o'clock P. M. He visited the patient the following morning at ten o'clock A. M., in company with Professor Z. Freeman. The boy then said his arm was hurting him, and Dr. Freeman examined the bandage to see if it was too tight. On the removal of the dressings his arm was seen to be blistered. He then said to Mrs. Steele that it was a bad fracture, and that he would hold the arm until she could get her family physician or another surgeon, unless she would assume the responsibility of the case. She told him to go on and do the best he could. He had explained to her the dangers of such a fracture. A part of the arm and the hand was of a darkish red, but there were no indications of gangrene. After puncturing several of the blisters, he re-applied the bandages, and then put on two splints; one on the inside, and one on the outside of the arm. The bandage extended from the end of the fingers above the fracture, the hand being bandaged straight. One of the splints was removed in a few days. When the long wooden joint splint was off of the inside he had an elastic splint on in its place, and a long wooden one on the outside. He had kept the fingers extended most of the time. The boy had never complained to him that the bandages were too tight. He treated the blisters with water dressings, and continued the splints four weeks or longer. The arm became offensive about one week after the accident. He had attended the boy at his mother's house on Kemble street about four weeks. The boy then came to his office a few times but the arm did not then require much dressing. He had given an unusual amount of attention to the case. The contraction of the

fingers began at the end of four weeks, but he had noticed such a tendency at the end of three weeks.

Cross-examined—He had never seen a more perfect cure, yet he never had a result like this. He did not believe a perfect cure had been reported of such a fracture, nor did he know of a result like this. He had taken the boy to the Clinic to exhibit his case, having had him under treatment altogether about seven months. He had never learned who the family physician of Mrs. Steele was, or that she had any. He had treated the case as a charity patient, never having made a charge against Mrs. Steele on his books.

Professor A. H. Baker called—Testified that he had been engaged in the practice of surgery for twenty-six years, and for seven years he had been a teacher, and was now Professor of Surgery in the Cincinnati College of Medicine and Surgery. He had known nothing of this case until to-day. The erysipelas spoken of was a result of inflammation, and that had been induced by injury done to the soft tissues. Thinks the ends of the bones had caused the inflammation. Inflammation gives rise to eleven or twelve products (some of which the Professor here enumerated). He had known injuries of this kind, and now has a case which may result in paralysis. Erysipelas might follow such an injury in from ten to twenty-four hours. In the majority of cases of this kind we have either total or partial anchylosis of the joint. He could not now speak with certainty of the character of this fracture, as the indications of the fracture in such a young patient may be so completely removed in eighteen months or two years that no mortal man can detect it. Doctor Newton stated that when he bandaged the arm he commenced at the tips of the fingers and continued it up above the point of fracture. The first he considered the most important bandage. Doctor Mott takes the position that a bandage cannot be applied too tight, provided it is not so tight as to produce mortification. The practice of Doctor Newton in this case was proper, and such as would have been followed by any judicious surgeon. The object of the bandage in such cases is, first, to make equal pressure, and secondly, to keep the parts in proper position. The splints are afterward applied to prevent displacement. The Doctor's application of the splints and bandages was in accordance with the rules laid down for dressing fractures. The fracture was an oblique one, and one that it is difficult to retain in its proper position. If the bones cannot be retained in their proper place, in a compound fracture, it would be best not to bandage until the inflammation is reduced. If the sharp end of bone was allowed to re-slip into the soft tissues, injury and inflammatory action would ensue. He should in all such cases adjust the fracture at once. This is a complicated fracture, and not a compound fracture. Doctor Newton gave the case more attention than is usually

given to fractures, and he considered that he was diligent in his attentions.

Cross-examined—The object of the bandage is, primarily to keep the parts in juxtaposition. In his experience of such fractures he had commonly found both the median and ulnar nerves more or less injured. Fractures of the *upper-arm* occur in the humerus, of course: and those of the *fore-arm* are more liable to fracture than that of the arm. In his practice the fractures of the fore-arm were more than double those above the elbow. He had seen a fracture very much like this. In this case the fracture was outside of the capsular ligaments. He had been in the practice of his profession in Cincinnati more than ten years, and had during that time treated many fractures of the arm. He had also had cases attended with erysipelatous inflammation in the fore-arm. It would depend on the character of the erysipelas to enable him to say whether he would remove the bandages or not. There are forms of erysipelas which he would treat with bandages. He had not heard Professor Blackman's testimony. Blisters are not always evidence of erysipelas, but they always proceed from inflammation, and they may result from internal or external inflammation. He thought that where the bandage was well applied it would prevent congestion rather than promote it; in this opinion he might differ from other surgeons. In erysipelas the vesicles may take any direction; they are apt however, to follow the outlines of bruises or pressure. Erysipelatous inflammation may appear in twenty-four hours. Generally where it appears, disappears, and then reappears it is caused by some peculiar diathesis of the system. Whether erysipelas can be induced in the system by bandaging or not is a question admitting of much discussion. The contraction of the flexor muscles would depend on various circumstances, extended over a considerable space of time. In this case there is some relief to the contraction by flexing the hand on the shoulder. The arm does not go back quite as much as the sound one. He had met with cases similar to this where the condyles were included, but he had not met with a case exactly like this in all respects. He had seen cases of oblique fracture where the union was as perfect as in this instance. The union is often so perfect that the fracture is to be detected only by post mortem examination. Nothing but the vigilance said to have been practiced by Doctor Newton could have retained the parts in proper position. In a case like this, where the broken bones had been thrust down into the soft part, the injury would be such as to make a perfect cure very difficult. No serious difficulty would result from the postponement of the dressings one day, three or four weeks after the accident. The postponement of any dressing at any time would not have produced such serious results as here presented. The bloodvessels are a firm texture, and

would not be so easily injured as the median nerve by the same violence.

Professor Z. FREEMAN called—Testified that he had been engaged in the practice of medicine and surgery for the past eight years, and is now Professor of Surgery in the Eclectic Medical Institute. He saw Charles Steele and his mother the next morning after the accident, at Mrs. Steele's residence on Kemble street, in company with Dr. Newton. He was introduced to the boy and his mother by Dr. N. The boy seemed to be in some pain. Upon examination he found the arm somewhat blistered, with some between the fingers. The hand was of a light purple color; the arm had a similar appearance to the hand after the bandage was unrolled; there were some blisters on the arm. The bandage was not, in his judgment, too tight. The elbow was rather of a purple color, which he thought, a natural consequence, when told by Dr. Newton that the fracture was an oblique one of the lower end of the humerus, the rough end of which had been thrust down into the soft tissues. The bandage had been commenced at the tips of the fingers, and evenly rolled upward, making an even pressure over the entire surface. He had examined the condyles, but had found no fracture—the fracture being above the condyles. He was perfectly satisfied as to the true character of the fracture. Mrs. Steele was weeping so much at the time, that he could not but sympathize with her. She said she depended somewhat on Charley for her maintenance. It was after the bandage had been removed that Dr. Newton proposed to hold the arm until Mrs. Steele could get another surgeon, or her family physician, to treat the case. She declined calling in any other physician, and both she and the boy requested Dr. Newton to go on and treat the case. The bandage was then applied over the arm and around the splints, which served to keep the arm in a proper and easy position. After this visit, he did not see the boy again until he was presented at the Clinic. It then had a different splint on. The bandage, when reapplied at the time of his first visit, was not put on so tight as the first one, because the arm was somewhat swollen, and both he and Dr. Newton were of the opinion that the swelling might be somewhat increased. When the boy was first presented at the Clinic, the elbow-joint was stiff, and the arm presented a red and smooth appearance, and the fingers were slightly contracted. The sores on the arm were old sores, but others came out during the time of his attendance. To remove these sores the mild zinc ointment was applied. He had noticed the bandages on the arm when the boy first came to the Clinic, and he considered them quite sufficient. He sometimes dressed the arm himself during the boy's attendance. In order to keep the parts in proper position, it is necessary to keep the bandages tight, and the more so if it is an oblique fracture; the ends of the fractured

bones in such a case being more easily displaced, than in a simple transverse fracture. He had been informed of the character of the fracture, in the first instance, by Dr. Newton, and then he examined it for himself. He was satisfied that it was an oblique fracture of the humerus above the condyles. There was some swelling at the elbow-joint, but no ecchymose appearance. It is not common, though sometimes the case, for erysipelas to present itself in cases of fracture. The blisters in this case were, in his opinion, the result of the attending erysipelas. Blisters might, however, be produced by inflammation of the skin. The present contracted condition of the fingers may have been produced by injury to the median nerve. The nerve being injured would cease to perform its natural functions, and there would not be furnished to the flexor muscles the necessary amount of vitality.

The legal points argued by defendant's counsel may be thus stated:

1. What is the responsibility assumed by a physician or surgeon in taking charge of a case? He does not undertake to effect a cure, in the same sense that a lawyer may undertake to gain a case for a client. If the law was so unreasonable as to require this, it would deter competent persons from practicing, and only the reckless and unskillful, who could not see the danger, would engage in the practice of the medical profession. It would prevent that kind of practice which consist in a choice of two evils.

2. The law requires the surgeon to possess *ordinary skill*, to be determined by the treatment of the particular case in hand.

3. To exercise *ordinary care and diligence* in attending upon and treating the case; and therefore,

4. In order to make out a case, entitling a plaintiff to recover against a physician, he must show:

That in some respect, which he must be able to point out, his treatment was such, that a majority of physicians of ordinary skill would, *at the time*, have pronounced it improper, or that he did not bestow that amount of attention and care upon the case, which a majority of physicians of ordinary carefulness and skill would have done.

The principles of law are so plain that they will relieve the jury from the main difficulty in the case, which is to determine the *cause of the injury complained of*. This involves the very difficult process of reasoning from effect to cause, or *vice versa*, where the *connection* between them is *involved in uncertainty and doubt*. New principles are being continually discovered—unexpected results are being constantly encountered.

The Court, having reviewed the testimony in detail, committed the case to the jury, with the following remarks:

"Thus, it will be observed, of the plaintiff's witnesses, one (Dr. Wood) expresses a *positive*, and another (Dr. Mussey) a *hesitating*

opinion, that the inflammation causing the injury was occasioned by over tight bandaging; two (Drs. Judkins and Van Ingen) give no particular opinion upon the subject, and the fifth (Dr. Blackman) declaring that from the evidence he *cannot* say that the application of the bandages was too tight, or that the injury resulted from any such cause; while they all agree, in common with the defendant's witnesses, that the character of the original injury was such, that it was sufficient of itself to produce the appearances indicated, and the unhappy consequences which followed; that it was exceedingly difficult of treatment, and, in a majority of cases, might be expected to terminate, in some way unfavorably. On the part of the defendant, Dr. Baker expresses the opinion, that the bandaging was not too tight, the treatment of the case was proper, and the injury sustained the natural result of the fracture itself. Dr. Freeman, who examined in person the first or original bandage, was satisfied it had been properly put on, and was not too tight, and approved of the second dressing. And the defendant himself testifies that he applied the bandages carefully, from time to time, and that, in his judgment, they were necessary, and not tighter than the case required. Among these respectable witnesses, it is not for the Court to intimate upon whose skill and judgment the greatest reliance can be placed; but we may with propriety say, that an honest opinion, founded upon a practical and personal observation, is much more likely to be accurate, than one founded upon speculation and the observation of others. It is due to the professional man, who has treated a case, in other respects fairly and attentively, that a candid and favorable consideration should be given to the judgment which he may form of his duty during the progress of that case; otherwise no physician or surgeon would dare to undertake, or be safe in the performance of his undertaking. In a case otherwise doubtful, this consideration alone should preponderate in his favor.

"Upon the whole, gentlemen, we declare that to entitle the plaintiff to a verdict, you must be satisfied from this evidence, that the injury of which he complains was not the natural result of the original accident, but was distinctly traceable to the mode of treatment pursued by the defendant; in the adoption and continuance of which, he did not apply that skill and care which men of ordinary intelligence and prudence, as physicians and surgeons, would have applied. Should this be your conviction, the plaintiff must recover such damages as will compensate him for the injury sustained, not exceeding the amount claimed. Should it be otherwise, or should you not be able to trace the cause of this injury, or your minds be unable to decide from the evidence whether the defendant has been in fault, according to the rule stated, your verdict should be for the defendant."

CHARLES M. STEELE, by his next friend, MARIA STEELE, plaintiff, *against* R. S. NEWTON, defendant. } *Superior Court of Cincinnati.*

Action to recover damages for improper treatment of fracture as physician and surgeon. Damages laid at $3,000.

COPY OF THE VERDICT.—Tuesday, November 25, 1856. Court Room No. 3, Hon. O. M. Spencer, Judge. And now come again the said parties and the said jury; and the said jury having heard the testimony, the arguments of counsel, and the charge of the Court, and having retired, under the care of the sheriff, to deliberate, return into court with their verdict in writing, signed by their foreman, and say: "We the jury, find the issue joined for the defendant."—*Journal, page*, 2151.

COPY OF THE JUDGMENT.—November 7, 1856. Court Room, No. 3, Hon. O. M. Spencer, Judge—"Therefore, it is considered by the Court, that the said defendant go hence without day, and recover of the said plaintiff his costs herein taxed." Costs, $53.36.

State of Ohio, Hamilton County, City of Cincinnati, } Sct. *Superior Court of Cincinnati.*

I, Thomas Spooner, clerk of the said court, do certify that the foregoing transcript contains a true copy of the verdict and judgment, rendered in said court at the November term, A. D. 1856, in the cause therein stated, as appears from the journal of said court in my office.

{L. S.} Witness my hand and the seal of said court, at Cincinnati, this 16th day of December, A. D. 1856.

THOS. SPOONER, *Clerk*,
Per E. P. CRANCH, *Deputy*.—R. S. N.]

When the fracture occurs above the attachments of the *pectoralis major* and *latissimus dorsi*, it is said to be in the neck of the humerus. In this case, the muscles just mentioned draw the lower portion of the bone toward the side, while the *supra-spinatus*, and other muscles inserted into the tuberosities, cause the upper fragment to project forward and rather outward.

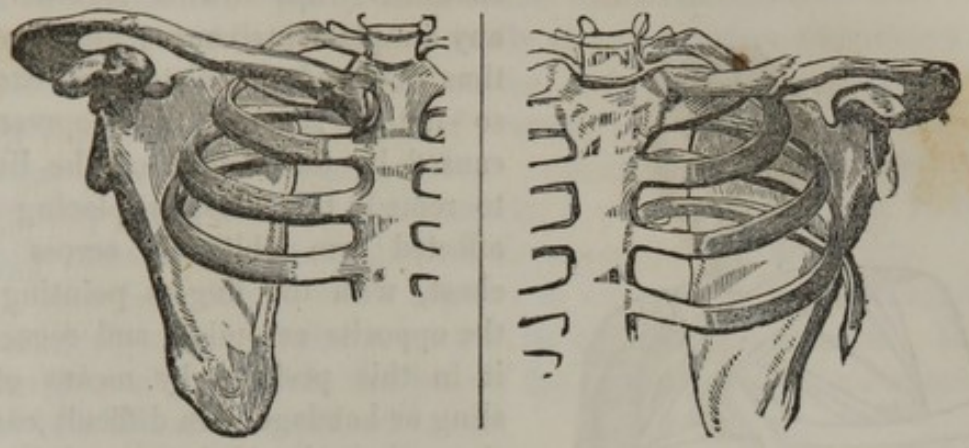
Fig. 48.



This accident happens from falls on the shoulder, and is easily recognized by placing one hand in the axilla, while the other subjects the humerus to rotation and abduction. The treatment requires a thick compress in the axilla to counteract the effect of the *pectoralis major* and *latissimus dorsi*, with a spica bandage to restrain the upper

extremity of the bone from being everted, and a sling to support the limb.

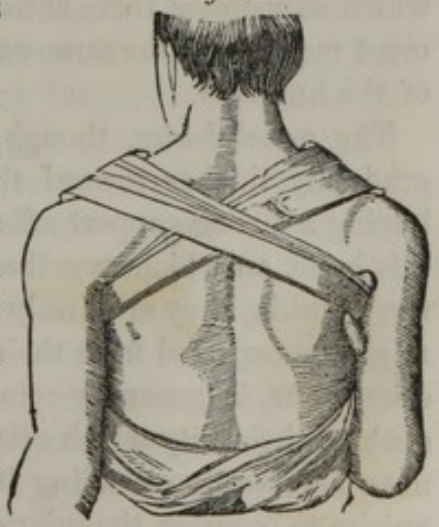
Fig. 49.



The *clavicle* is frequently fractured, by external violence acting directly, and also when transmitted through more or less extent of the superior extremity. The pain, swelling, mobility, and crepitus of the broken part, which is usually about the beginning of the acromial curvature, readily betray the injury, which is rendered still more obvious, by the sternal extremity of the bone being drawn up by the sterno-mastoid muscle, and the shoulder being depressed, brought nearer the sternum, and rendered more prominent forward by the action of the *pectoralis major* and *latissimus dorsi*, assisted by the weight of the limb. In children, the displacement is much less observable than in adults, owing to the lightness of their arms, and hence the injury in them is frequently not discovered until the swelling which attends reunion attracts attention.

Great difficulty has been experienced in treating this fracture; and Desault's method, though complicated and troublesome, has been regarded the best for the purpose. It consists of a thick cushion fixed in the axilla, to serve as a fulcrum for removing the shoulder outward to its proper position, by means of the humerus, when brought close to the side; a bandage to keep the cushion firm, another to fasten the arm, and a third to elevate the shoulder, by drawing up the affected elbow. When the cushion in the axilla is secured so high and so firmly as really to serve the office of a fulcrum, it compresses the nerves and bloodvessels beyond endurance; and if it be allowed to descend so as not to do this, it increases the distortion, by separating the arm from the side.

Fig. 50.



The method which, on the whole, appears to be the most simple and efficient, is to brace back the shoulders by a figure of 8 bandage, or shoulder-straps drawn together by any simple contrivance; and having thus obviated the distortion, except so far as regards the depression caused by the weight of the limb, to remedy this also, by placing the affected arm obliquely across the chest, with the fingers pointing to the opposite acromion, and securing it in this position by means of a sling or bandage. In difficult cases, the patient should be treated in the horizontal posture, which, of course, greatly lessens the tendency to displacement.



The *scapula* may be broken through the acromion process, neck, body, and inferior angle. The first of these fractures is the most common, the others being very rare. It happens from direct violence, occasions nearly the same symptoms as fractured clavicle, but not so well marked, and requires similar treatment. The neck of the scapula is broken by violence transmitted through the humerus. The symptoms of this fracture are filling up the axillary cavity by the head of the humerus — a hollow under the acromion process from the bone being out of its place—and easy restoration of the parts to their natural position, when the shoulder is gently extended outward; during which adjustment there is usually some crepitus perceived. The treatment required is the same as that recommended for fracture of the neck of the humerus.

The *nasal bones*, though very thin at their extremity, becoming gradually thicker toward their connection with the *os frontis*, and having a strong support afforded to them by the projecting process of this bone, on which, together with the ascending branches of the superior maxilla, they are firmly placed, suffer fracture less frequently than might be expected from their exposed situation. The fracture, when it does occur, is generally comminuted, and is easily recognized by the striking deformity which arises from the flattening and obliquity of the nose necessarily attending it. A great degree of violence being requisite to occasion the injury, there is usually much swelling, which is apt to conceal the displacement of the bones, if the examination be not made immediately after the accident is sustained. Whence it is

proper in all cases where the injury may be suspected, to search very carefully for it, since the inevitable consequence of its being overlooked would be a deformity equally disagreeable and irremediable. The depressed portions of bone may be easily elevated before they become consolidated by the effusion that ensues, and after being pressed up into their proper places by a pair of dressing forceps, or other suitable instrument, generally remain without requiring permanent support. Should they prove not sufficiently steady, a piece of lint ought to be carefully introduced, so as to distend the upper part of the cavity.

The *lower jaw*, though much exposed to violence by its situation, is comparatively seldom broken, owing to its mobility and strength. The fracture is usually seated in the base of the bone, opposite the bicuspid teeth. It is sometimes confined to one side, sometimes exists in both. It very rarely happens in the ramus, and is hardly ever met with at the symphysis. The nature and seat of the injury are readily recognized, owing to the thinness of the parts which cover the jaw; and it is generally observed that the portion of the bone next the chin is depressed, partly by its own weight, partly by the action of the muscles which connect it with the *os hyoides*.

Fig. 51.

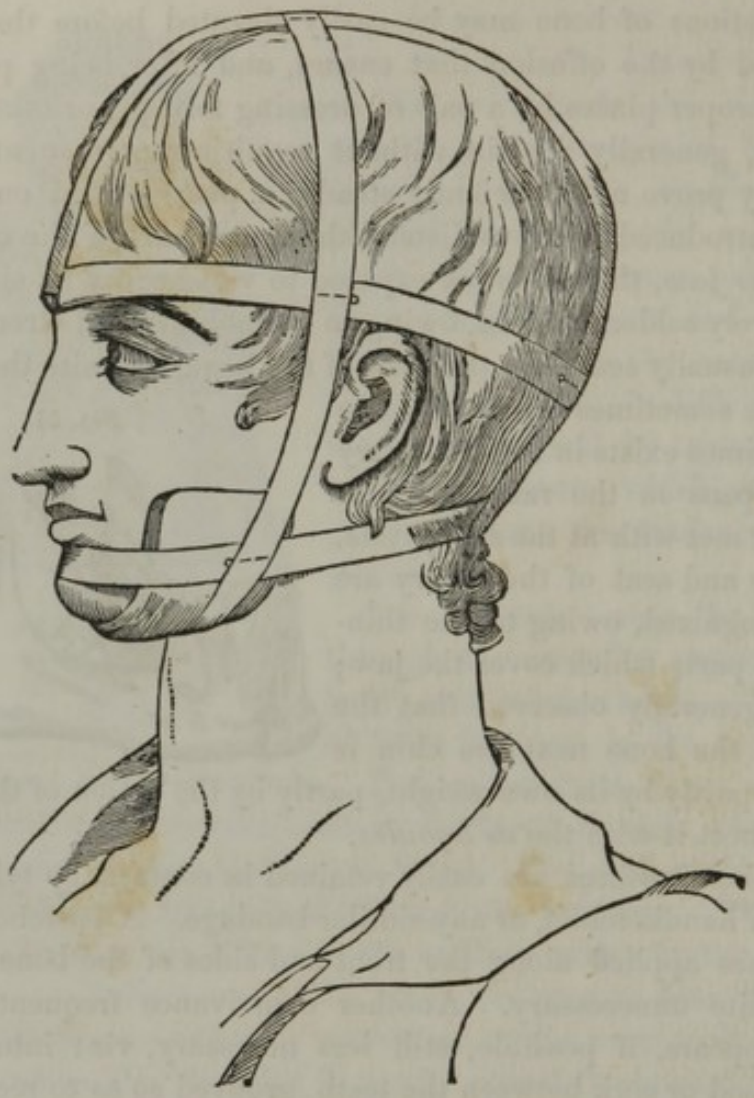


The broken surfaces are easily retained in contact, by tying up the jaw with a handkerchief, or any similar bandage. A pasteboard splint is sometimes applied along the front and sides of the bone, but is in general quite unnecessary. Another contrivance frequently recommended appears, if possible, still less necessary, viz: interposing a piece of wood or cork between the teeth, grooved so as to receive them in a channel both above and below. This is done to restrain motion of the jaw, and afford room for the introduction of nourishment; but the shape of the teeth effectually prevents any lateral movement when they are held together by a bandage, and there are always sufficient interstices between them to admit the entrance of soups or other fluid articles of food, which kind of nutriment alone the patient is of course able to consume, when deprived of the power of mastication. In cases where, owing to the obliquity of the fracture, or any other cause, it is found unusually difficult to maintain the edges of the bone in contact, a thread or silver wire may be tied or twisted round the roots of the adjoining teeth, so as to draw them together; but this expedient should not be resorted to unnecessarily, since it is apt to loosen the teeth concerned.

[This cut illustrates very well the bandage necessary in fracture of the jaw. It is the plan originally recommended by Gibson. This

fracture should be well treated, or the deformity is very disagreeable.—R. S. N.]

Fig. 52.



The *ribs* are generally broken by violence, but also by pressure applied to their extremities, which difference in the cause has been supposed to modify the consequences of the accident; since, when the fracture is caused by direct violence, the rough spicula of bone are projected inward, and readily injure the pleura or lungs; but when the rib is broken by being bent outward by approximation of the sternum to the spine, the parts contained within the chest are less endangered.

The fracture is attended by pain, aggravated by respiration, and by obscure crepitus. It is best ascertained by placing the hand on the injured part while the patient breathes. The diagnosis is frequently far from easy, from the patient's inability to bear the necessary examination; but its accuracy is not very essential, since the treatment proper for fracture is the same with that required for a bruise of the muscles, the only injury with which it can be confounded. A broad bandage ought to be applied tightly round the chest, and bleeding,

purgatives, and tartrate of antimony must be used according to circumstances.

Fractures of the *cranium* and *vertebræ* being of consequence, chiefly on account of their connection with accompanying injuries of the brain and spinal marrow, will be considered most advantageously along with these subjects.

The great strength and arched form of the *pelvis* enable it to resist all ordinary degrees of violence, and it is only when subjected to the most powerful compression, as from the weight of a loaded carriage or the force of machinery, that the bones composing it give way. They yield most frequently in the horizontal and descending branches of the *os pubis*, and at the same time there is usually a separation of the sacro-iliac synchondrosis on one or both sides. The precise extent of the injury can hardly be ascertained, except by dissection; but the existence of fracture is generally rendered very manifest by the pain, mobility, and crepitus which attend it. Sometimes it is made still more obvious by the ramus of the *ischium* or *pubis* being driven through the perineum, or the coats of the rectum.

Such fractures are almost certainly fatal, from the great shock of the system and injury of important organs with which they are accompanied; but the patient ought always to be afforded the chance of recovery, by binding the pelvis tightly with a broad circular bandage, and protecting him from excitement of every kind.

The crest of the ilium is occasionally broken by falls and blows; the accident is easily recognized, produces no serious consequences, and requires merely rest, and a spica bandage.

[The surgeon should have a full assortment of bandages, rollers, splints, and other apparatus used in treating fractures, always on hand. When called to treat a case of fracture, he should see that the bed on which the patient has to remain several weeks, provided the fracture is such as to require it, is made up *hard*—a cotton or hair mattress being preferable. The surgeon should carefully examine the fracture, and freely state the nature of the case to the patient and his friends, being cautious not to conceal the probable results. If he finds that he will be expected to perform impossibilities, he had better let him send for some one else, so that they may be perfectly satisfied as to the state of affairs. If the surgeon then concludes to treat the case, let him remember that both himself and the patient have much at stake in the result—he in his reputation, the patient in the best possible preservation of his body. The surgeon should aim to secure firm union, little or no deformity, and the natural use of the limb. In some fractures, especially those about the joints, more or less stiffness is almost sure to remain, and this will often be so under the most favorable treatment. If there is much swelling and inflammation, they are to

be reduced by fomentations and sedative agents, of which the tincture of veratrum viride and gelseminum, locally applied, are very good. The muscles are then to be relaxed, and the bones put in proper contact, and such splints and rollers applied as may be demanded by the particular case, in order to avoid redisplacement. The old custom of impoverishing the patient by bleeding and sedative agents, together with an antiphlogistic diet, is no longer thought of. The repair of the injury demands all the surplus vitality of the system; and often it is then not sufficient to bear the drain with impunity—hence the necessity of toning up the system and thus enabling it to complete the cure in the quickest possible time. The bandages and compresses should not be applied too tightly, for from this reason mortification has over and again been induced. If the fracture is a compound one, there should be free vent given to the discharging matter, and if splinters keep up inflammation in an inordinate degree, they should be promptly removed. Wet and cold applications usually do more harm than good. The dressings should be light as possible, and the limb maintained at rest. These considerations are founded on much experience, and will correctly guide those who follow them.—R. S. N.]

DIASTASIS OR SEPARATION OF THE EPIPHYSES.

Before the epiphyses are united to their respective shafts, they are apt to suffer separation from them by such violence as, in the adult, would occasion fracture of the bones concerned, or dislocation of their articulating extremities. The symptoms resemble those which would result from fracture in the same situation, and the treatment does not in any respect require to be different.

BENDING OF THE BONES.

While the bones are young and flexible, they sometimes bend instead of breaking, when subjected to forces that would occasion fracture in the adult; or rather give way only partially, so that, while altered in form, they still retain some power of resistance. As this accident is not attended with either mobility or crepitus, it is very apt to be overlooked, the distortion of the limb being attributed to swelling of the soft parts, in consequence of the injury. The bones of the forearm are most subject to suffer in this way. In order to remove the curvature, and prevent it from permanently deforming and impeding the use of the limb, it is necessary, without loss of time, to employ force sufficient for straightening the bone. If this is done effectually, subsequent mechanical support will hardly be required; but if, from delay or undecided measures in the first instance, the bones should remain bent, a rigid splint of wood or iron ought to be applied, so as to promote the restoration of their proper form.

FALSE JOINTS.

Fractured bones sometimes do not unite firmly together, and their extremities either remain quite detached, or are connected by a flexible fibrous medium. The most common examples of this occurrence are afforded by the patella and neck of the femur; but there is no bone in the body where it may not take place. Its consequences are in general extremely distressing, since the want of due rigidity, of course, renders the limbs very imperfect, and sometimes quite useless, for performing their ordinary duties.

The principal cause of this occurrence is unquestionably the want of due fixture during the cure, which prevents the fractured extremities from remaining at rest, it being well ascertained that false joints may be certainly produced by subjecting the bones concerned to frequent motion. The best means of prevention are consequently to set the fracture as early as possible, and afterward to retain the bones steadily in their proper places.

Before considering the treatment of false joints, it is necessary to ascertain the nature of the structure which constitutes them. It is often said to be similar to that of the natural articulations, being composed of two opposite plates of cartilage, a covering of synovial membrane, and a capsular ligament. But in most cases there is merely a tough, fibrous, ligamentous-looking mass, which extends from one extremity of the bone to the other; and the nearest approximation to a new articulation, which almost ever occurs, consists in the existence of cavities, more or less extensive, between the fibers of this connecting substance.*

The mildest treatment is to maintain perfect rest by particularly careful employment of the usual means. Should this not prove sufficient, an ingenious method, contrived by Dr. Physick, of New York, may be tried. It consists in passing a skein of silk or cotton between the extremities of the bone, and allowing it to remain until it appears that new bone begins to be formed, when it may be withdrawn, and splints applied. In case these means fail, and the patient is willing to suffer considerable pain, and encounter some danger to obtain a cure, the plan originally devised by Mr. White, of Manchester, may be executed. This was to cut down upon the extremities of the bone, and saw them off; after which, the ordinary treatment of compound fracture being employed, the limb regained its firmness, with more or less shortening, according to circumstances. This operation is not always successful; and it must always be attended with considerable

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* Probationary Essay, on entering the College of Surgeons, by W. Sharpey, M. D., Edin., 1830.

danger, especially when the bone concerned is of large size. It, therefore, ought not to be performed until the more gentle means have proved unavailing, and unless the patient suffers so much inconvenience from the want of rigidity as to warrant such a severe proceeding. In the humerus and fore-arm, the muscles are so equally balanced, that the limb, though quite flexible at the injured part, can sometimes be used for most of the purposes for which it is required. In ununited fractures of the thigh-bone, I have succeeded, so late as after the expiry of six months from the date of the accident, in obtaining a complete recovery, by employing the long splint with the following modification. In cases of this kind, the limb is always distorted, from the imperfect resistance opposed by the broken bone to the contraction of the muscles, and there thus results an arched form of the thigh. On the convexity of this arch, which is directed outward and forward, a cushion formed of a sheet or tablecloth, folded into the requisite size, is placed and made to rest on the long splint, which is then drawn tightly toward the knee and pelvis. There is thus not only exerted a constant force, urging the bone into its straight direction, but also the most perfect stability afforded to the fractured surfaces. In one instance, where I advised this plan to be adopted, Dr. Peddie succeeded in restoring the use of his limbs to a young man who was admitted into Minto House, on account of both thigh bones having remained ununited, with great distortion, four months after being broken by a fall from the masthead of a vessel.

[The subject of false joints has engaged much attention among surgeons, and many theories and plans of treatment have been proposed. As to the character of the joint and its peculiar features, all are agreed, but as to the causes there is a wide difference of opinion. The views of Mr. Syme are as rational as those of any author who has treated it, and I should not have added a remark to his article on this subject, but to subserve a very important doctrinal point, while I introduce some of the opinions of others as to the causes and means of cure. It was the opinion of M. Chelius that bad setting of the fracture, improper splints, and too frequent motion of the limb during the period immediately following the setting, and old age, were the prominent causes of non-union. Six months is the time allowed by him for union to take place, and if it has not then occurred, the surgeon is to regard the case as one of non-union; but I am of the opinion that two or two and a half months is limit enough for more or less complete ossific union. Amesbury thought that almost any case of non-union resulted from want of rest in the limb. Sir Astley Cooper thought that the accident resulted from continuing cold applications for too long a period to the part, thus checking that degree of inflammation which is absolutely necessary to bring about union of the parts. The surgeon should bear

this in mind. It has also been contended that old age and pregnancy both tended to prevent union, but Erichsen says he has found no difficulty in producing complete union in patients over ninety years of age; and Amesbury saw only two cases of non-union during gestation, in over ninety cases. The real causes are very numerous; among them may be noticed as prominent causes, a scrofulous cachexy, the presence of large suppurating ulcers, the presence of fragments of bone between the broken ends, or any other foreign substance, and especially the prevention of the requisite inflammation, to insure ossific union. Again, fractures may be so driven together and nicely fit, especially in smooth transverse fractures of the shaft of the femur, that union is never accomplished, because the causes are not present to insure the requisite inflammation.

As to the principles of cure, authority is pretty much united. Hunter's plan was to lay open the fracture and irritate the ends of the bone, so as to induce fresh inflammation. The irritation of the ends of the bone was accomplished by the older surgeons by simply rubbing the ends of the bones together, and thus irritating them, as was Hunter's plan, without cutting down to the seat of the fracture. For destroying the cartilaginous substance which forms on the end of the bone, various plans have been devised, such as the application of caustics, scraping the ends, pressing the ends together, so as to get up inflammation, and thus induce ossification of this substance, and sawing off the ends of the bone, as recommended by Mr. Syme. One of the chief objections to Mr. Syme's plan is the certain shortening of the limb, and for this, as well as other reasons, I think so harsh a measure should be the last that is tried. Erichsen admits that a want of inflammation is the cause of non-union, and recommends as a prominent part of the treatment, the excitement of sufficient inflammation to cause a deposition of the proper plastic matter for ossification. For this purpose, he recommends acupuncture needles and the seaton, but admits that this latter may give rise to dangerous hemorrhage. He is also in favor of Dieffenbach's plan of driving in ivory pegs to get up the requisite inflammation. In perusing most works on surgery, the student will find that the custom is to combat inflammation by various means, and that where such powerful means exist that it must be often too successfully warded off. But when non-union of a fracture has been established, they all admit the *necessity* of inflammation, and set to work in various ways to induce it. This is a practical acknowledgment of the Eclectic theory; hence we are right in discarding bleeding and all other appliances made use of to reduce inflammation. The cold applications are even admitted by Cooper to be a common cause of non-union. When non-union has been clearly established, I am in the habit of using pressure and other means for inducing

inflammation, and then feeding the patient on a high rich diet and tonics; and I hold that, to tone up the system and foster moderate inflammation, when a fracture has been well set, is almost a sure guarantee of osseous union, unless there be very extensive cancerous disease present.—R. S. N.]

INFLAMMATION OF BONE.

Inflammation of the periosteum, and that of the bone itself, frequently occur together, give rise to similar symptoms, and require nearly the same treatment. The former, or Periostitis, is characterized by deep-seated aching pain, redness of the integuments, which adhere to the part affected, and slight, diffused swelling. These symptoms vary much in the degree of their acuteness, and are accordingly accompanied with more or less constitutional derangement. The disease frequently becomes periodically aggravated, and is apt to be increased by all sorts of excitement. It is usually most severe during the night, and after meals. The periosteum is most liable to inflammation where it covers bones near the surface of the body, as the shin-bone, the skull-cap, the clavicle, and sternum.

It is generally possible to trace the operation of a predisposing, as well as of an exciting, cause of the disease. The former seems to consist in derangement of the system from various circumstances, but most frequently from the prejudicial use of mercury co-operating with venereal disease, especially in a scrofulous constitution. The latter includes exposure to cold and wet, and blows. Middle-aged adults are the most common subjects of its attack.

The mode of treatment depends upon the intensity of the symptoms. When they are very violent, and attended with much fever, the most effectual practice is to make a free incision through the inflamed parts down to the bone. When less severe, no benefit is derived from this proceeding, but they yield to leeching or cupping, warm anodyne fomentations, camphorated mercurial ointment with anodyne liniment, and opium administered internally along with calomel, ipecacuanha, tartrate of antimony, or colchicum. When still more chronic, they require repeated blistering, with an alterative course of the hydriodate of potass, or the oxymuriate of mercury, six grains of the former, and half a grain of the latter being given daily in divided doses, and occasional small doses of the saline cathartics.

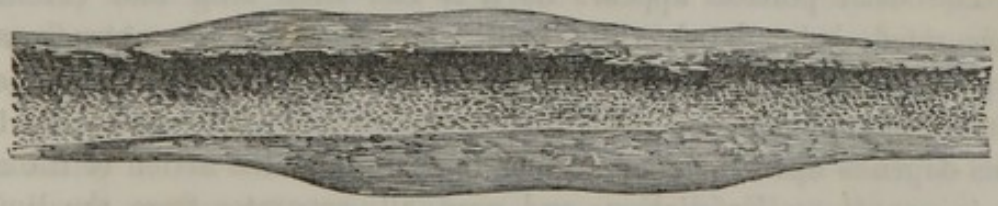
[Mr. Syme, it must be recollected, was not aware of the existence of the prominent agents now in use among Eclectics, and of course gave only those in common use. Where he uses the blister, we use the irritating plaster; and for alteratives, we use the compound syrup of stillingia, phytolacin, irisin, stillingin, podophyllin, and similar

agents. The tartrate of antimony may give place to gelsemin, or veratrin, hydriodate, potassa, irisin, xanthoxylin.—R. S. N.]

The decoction of sarsaparilla is generally prescribed, but I believe without any beneficial effect, farther than inducing the patient to conform to dietetic rule. The formation of matter is a very common consequence of chronic periostitis, but, in this case, absorption may be almost always induced by using the means just mentioned; and, therefore, an opening of the cavity ought to be avoided. Should it take place, moist dressing, with occasional blisters, will be found the best means of treatment.

Inflammation of the substance of the bone (*Ostitis*) is attended with nearly the same symptoms. The pain is, if possible, still more deep, dull, and aching; the integuments, though exhibiting the same changes in the progress of the disease, are not so much altered in the first instance; and the swelling affects the shape of the bone more extensively. It occurs at all ages, but chiefly in childhood and youth, and in persons whose constitutions are deranged in the same way that predisposes to periostitis. In the former it is generally acute, and in the latter most frequently chronic. When acute, it generally terminates in death of the dense osseous tissue, and in suppuration of the spongy bone. When chronic it expands the texture of the shafts, so as to make them larger and less compact, and in the cancellated texture usually induces either absorption or suppuration.

Fig. 53.



The treatment is to be conducted on the same principles as that of periostitis. When the inflammation is acute, it terminates very speedily in suppuration or death of the part affected, and seems to be hardly influenced by any remedial measure. But when chronic it is more under control, yielding in the dense bones to blisters, employed along with alterative medicines, and in the spongy bones to the actual cautery. The swellings which are occasioned, both by chronic periostitis and inflammation of the bone itself, are called Nodes.

NECROSIS.

The expression Necrosis has been employed to denote different morbid affections of the osseous tissue and has consequently given

rise to much confusion. It literally implies the deprivation of life, and ought to be restricted to this meaning.

All the bones are liable to necrosis, but those which possess a dense texture are more subject to it than the spongy ones. The causes of necrosis are various. It was formerly believed, that the mere removal of the periosteum certainly caused the death of a scale of the bone more or less thick, by depriving it of nourishment, and hence it was a rule, with the old surgeons to hasten exfoliation in such cases by applying the actual or potential cautery. But it is now ascertained that simply removing the periosteum does not necessarily cause exfoliation, and that when a bone throws off a scale, after being so exposed, it generally does so in consequence of the injury which it has sustained from the violence that occasioned the separation of the membrane. Blows, falls, strains, and exposure to cold, are the causes that most frequently give rise to necrosis, and they act either directly, by at once destroying the vitality of the part affected, or indirectly by exciting inflammation, which terminates in the death of the bone. The inflammation, when acute, is not confined to the bone, but generally affects all the superjacent tissues; whence it has been erroneously supposed, from redness of the skin being present, that erysipelas or inflammation of the skin may induce necrosis. There often seems to be a constitutional proneness to necrosis, so that many bones of the same person die together or successively. This disposition exists most frequently in childhood, and is almost always associated with, perhaps dependent upon, weakness of the system.

The dead portion appears as if it had been long and carefully macerated, being hard, white, brittle, and sonorous when struck with a probe. If exposed to the air previous to separation, it suffers various alterations of color, and generally, in part at least, becomes black; but this depends upon the discharge of the sore, and the action of the air. It is named an Exfoliation, and gradually separates from the living bone by ulcerative absorption. The circumstances which attend the process of exfoliation and its reparation vary much, according as it effects the external surface, internal surface, or the whole thickness of the bone concerned.

EXTERNAL EXFOLIATION.

The external surface of bones being most exposed to those injuries which cause exfoliation either directly by their violence, or indirectly by exciting inflammation, most frequently suffers from it; and, of particular bones, those nearest the surface of the body, as the tibia and cranium, are, as might be expected, more especially liable. The separation of the dead portion, being effected by a process of the living system, does not admit of any assistance from the surgeon, whose interference could hardly fail to do harm, by injuring the adjoining

sound bone. Free vent ought to be afforded by proper incisions to the matter, which is copiously secreted; and the exfoliation should be examined from time to time with the probe, to ascertain whether or not it has become detached. So soon as it is found to be loose, it ought to be removed by means of forceps, either through the opening which already exists in the integuments, or a suitable extension of it. The remaining surface granulates, and osseous matter is effused under the pellicle, so as to fill up the breach partially, but usually leaving a permanent depression at the part.

INTERNAL EXFOLIATION.

It is of course only in the cylindrical bones that exfoliation from an internal surface can take place; and those of the largest size are most frequently the seat of it. The cause is almost always inflammation, since the injuries which directly occasion necrosis can rarely operate on the interior of a bone. The exfoliation in this situation is named a *sequestrum*. It separates from the sound bone as in the former case; but having done so, cannot escape through the walls of the shaft within which it is inclosed, and therefore remains a permanent source of irritation. The living bone in consequence becomes greatly thickened, and new osseous matter is copiously effused from its external surface in the form of irregular projecting tubercles.

At the same time the pus, which is pent up within the cavity, by its pressure on the parietes, induces absorption, and the formation of cylindrical apertures through the shell of the bone. These *cloacae*, as they are named, allow the confined matter to escape, and present itself under the integuments in the form of an abscess, which, if not opened by the surgeon, sooner or later, evacuates its contents by ulceration. Thus far during the process, the patient suffers from pain and swelling of the limb, but after the matter obtains free vent, he finds himself greatly relieved. The enlargement, though it does not disappear altogether, subsides very much, and so little uneasiness remains that he is generally able to make some use of the limb. If it should fortunately happen that the sequestrum is not only small, but also favorably situated for escaping through a cloaca, the source of irritation being thus removed, the patient may be restored to health. But if the sequestra do not pass out spontaneously, the surgeon, having ascertained their presence by the probe, must enlarge the opening, which leads into the cavity containing them, so as to obtain space sufficient for their extraction. In order to do this, he makes a simple, or, if the part admits of it, a crucial incision through the integuments, having the cloaca for its center, dissects back the flaps, and applies the trephine over the opening should there be room for doing so, and if not, as is usually the case, he employs the cutting-pliers to enlarge the

opening sufficiently. The process of extraction may sometimes be facilitated by dividing the sequestrum into pieces.

EXFOLIATIONS OF THE WHOLE THICKNESS.

Bones die throughout their whole thickness from causes similar to those which induce exfoliation of their external or internal surface, and the dead portion separates from the living by the same process; of absorption that occurs in such cases; but the state of the bones, after the cure is completed, requires in this case particular consideration. Sometimes the place of the dead part is not at all, or very imperfectly supplied, as in the case here represented, in which I performed amputation on account of the limb remaining useless; at other times its separation could hardly be suspected from any change visible in the shape or size of the bone affected. In order to account for this remarkable difference, it is necessary to inquire into the circumstances of the cases in which it is exhibited.

Fig. 54.



When the dead bone is detached, in some case, the remaining surface merely granulates, just as after the separation of an exfoliation which extends only partially through the whole thickness, and effuses sufficient osseous matter to round off the edges, thus lessening the extent of the gap, but still leaving a permanent deficiency at the part. The same result ensues when a portion of bone, including its whole thickness, is removed mechanically. But at other times, the dead portion is found to be contained within a more or less complete case of new bone, which is ready to take the place of the old one whenever it is removed, by contracting its sides together so as to become a solid mass.

It was formerly supposed that the death and reproduction of an entire shaft, in this way, was a very common event, all cases of internal exfoliation being regarded as instances of its occurrence, and the expression Necrosis has been generally employed to denote this remarkable process. It might have been supposed that when only small sequestra made their appearance, or were found on dissection, decisive proof would have been afforded of the partial extent of the disease. But the general swelling of the limb, which is caused by the irritation

of an internal exfoliation, having led to the erroneous belief that an entire new shell was forming about the old bone, the non-appearance of a sequestrum, adequate to the supposed extent of destruction, was accounted for by attributing its diminution or removal to the absorbing power of the vessels, or the solvent property of the pus. It is now well ascertained that the sequestrum cannot be acted upon in either of these ways; and that its size may, therefore, be safely taken as a measure of the extent to which the bone has died. According to this test, it is found that the death and regeneration of an entire shaft, so far from being a very common occurrence, is an extremely rare one; and some pathologists, as Leveillé, have gone so far as to deny it altogether, alleging that more or less of the external part of the old bone always remains, and becomes expanded into the new shell. There can be no doubt, however, judging from the size, shape, and smooth surface of the sequestrum, that it sometimes, though certainly very seldom, comprehends the whole thickness and circumference of the shaft.

The origin of the substitute in cases of this kind has been variously explained. It must evidently proceed, 1. From granulating action of the portion that remains. 2. From the old bone previous to its death. Or 3. From ossification of the periosteum or other surrounding tissues. The first of these opinions has been supported by Richerand and others, who regard as strongly in their favor the fact, that more or less of the old shaft, and at all events the epiphysis, always remains. But in external exfoliations the granulating action seldom, if ever, fills up the breach; and when a considerable portion of the whole thickness of a bone is destroyed suddenly by inflammation, or is removed by mechanical means, the loss of substance is in general not fully restored, which it ought to be, according to this view of the matter. In cases where no permanent deficiency remains after the separation of the dead bone, it is generally noticed that the limb becomes enlarged previously to this event; and experiments on the lower animals, as well as observations of what happens in the human body, tend to show that the new shell may begin to be formed before the death of the old shaft. Dr. Macdonald remarked that the new bone, when first formed, adhered inseparably to the old one; and the late Professor Russell injected the vessels of the old shaft, while its substitute was in progress of formation. It has hence been concluded that the ossifying process originates from the old bone, and that unless the foundation of a new one be laid by it, previously to its own death, the loss of substance will not be replaced. But it has been fully ascertained, as well by experiment in the lower animals as from observation of disease in the human body, that a bone, though suddenly deprived of life, may still be reproduced; and, on the whole, it seems clearly established, that the

periosteum must be regarded the main source of reproduction. The views which I entertain on this subject will best appear from the following extract from the Transactions of the Royal Society of Edinburgh.*

"The property of forming new bone was first attributed to the periosteum by Duhamel, about one hundred years ago. Having been engaged in the study of vegetable physiology, and more particularly in regard to the formation of wood, he imagined that there might be an analogy between the inner layer of the bark and the periosteum, and that as the former hardens in successive layers so as to constitute the wood, the latter might suffer a corresponding conversion into bone. He supported this opinion by the following arguments: 1. That when bones are burned in the fire, or exposed to the weather, they separate into a number of thin plates. 2. That, in consequence of disease arising from external violence, the bones frequently throw off thin scales, or exfoliations as they are called. 3. That when animals are fed alternately with madder and without it, their bones exhibit alternate layers of a red and white color; and, 4. That when bones are fractured, they unite by means of an osseous capsule formed externally to, and embracing the broken extremities, just as the branch of a tree acquires strength after being grafted, or simply broken across.

"This theory of Duhamel was strenuously opposed by Haller, who urged, as altogether inconsistent with it, the mode in which bones are originally formed. He carefully investigated the process of ossification during incubation, and detailed the steps of its progress in the chick as well as in other young animals. The rudiment of the future bone being traced from its earliest distinguishable appearance, was found first to present the characters of a jelly; then to acquire the consistence of cartilage or gristle; and finally to reach the perfect osseous state; whence it was contended, that a structure which thus originated in a distinct form, and independently of any other, could not owe its increase afterward to a different source. Haller also engaged his pupils, Detlef and Bœhmer, in extensive series of experiments, by breaking the bones of animals, and feeding them with madder during their recovery; from the result of which he inferred, that Duhamel had been mistaken in supposing that fractures are reunited by ossification of the periosteum.

Notwithstanding these objections, and the authority of the physiologist from whom they proceeded, the doctrine of Duhamel still maintained its ground; and not long afterward—viz: in the year 1780—derived a great accession of strength from the experiments of Troja, who, by destroying the marrow of bones, caused their death, and the

* Vol. xiv, 1837.

formation of new shells surrounding them, apparently from ossification of the periosteum. This experiment, which Troja himself performed some hundreds of times, when repeated and varied by the pathologists of almost every country, seemed to confirm the ossific power attributed to the periosteum beyond question, until Scarpa, the late distinguished professor of Pavia, again investigated the grounds on which it was originally founded by Duhamel. In Scarpa's treatise, "De Penitiori Ossium Structura," which was published in 1799, he explained that the foliated appearance, presented by bones that had been burnt, did not depend upon the development of a structure naturally belonging to them, but was an effect produced by the unequal action of the fire; and that the separation of scales from diseased bones was no stronger proof of their possessing a laminated structure, since thin and broad portions of dead substance are wont to be detached from the skin and other soft textures, in which it was never supposed that layers existed naturally. He recalled attention to the synthetic experiments of Haller, who, by investigating the formation of bone from the earliest stage to its perfect state, had established the reticulated nature of its texture; and by an opposite process of an analytic kind, which consisted in depriving bones of their earthy constituent by means of diluted acids, and then macerating them for a long while in water, he unraveled the texture so as to show that it really was reticular. As a consequence of these observations, Scarpa denied that bone could be formed by the periosteum; and this opinion was keenly embraced by several pathologists of the present century, and particularly by the French surgeon, Leveillé.

At present, professional opinion is divided in regard to the ossific power of the periosteum, and different sides of the question are maintained by teachers and writers in this as well as other schools of medicine. As the point in dispute is not merely a matter of curiosity, but one of great practical importance, it is very desirable that the truth should be ascertained. It would detain the society too long were I to show how the different opinions on this subject may influence the practice of surgery; and I shall, therefore, proceed to state the considerations which have completely satisfied my own mind, and are, I think, sufficient to satisfy any one who is open to conviction, that, though Duhamel was misled into many errors by the false analogy which he supposed to exist between wood and bone—in regard to the mode of their natural formation — the periosteum nevertheless does possess the power of producing new osseous substance in certain conditions of disease.

The well-known and often-repeated experiment of Troja, which consisted in perforating the cavity, and destroying the marrow of a bone, so as to kill it, and cause the formation of a substitute, in the form of

a shell, surrounding the old one, was devised in imitation of a process which not unfrequently occurs spontaneously in the human body. In this disease, which has been named Necrosis, a portion of the old bone dies, and becomes surrounded by a new one. The new shell is of a larger size and more irregular form than the old one, which may be seen through a number of circular apertures lying a prisoner within this structure, intended by nature to serve as a substitute for it. Those who deny the ossific power of the periosteum, maintain, that in all such cases, whether resulting from injury purposely inflicted with the view of experiment, or proceeding from diseased action, a portion of the old bone remains alive, and serves as the germ of a new one; that, in short, the formation of the new bone is simply an expansion or growth from the remnant of the old one, and that if merely the extremities of the bone affected remain alive, they will prove sufficient for generating the substitute shell.

It is difficult to reconcile this explanation with the rapid growth and uniform thickness of the new bone; since, if its formation proceeded from the extremities, the process should be slow and progressive toward the center; but there is another objection still more conclusive against it. If the new bone is formed by a portion of the old one that remains alive, then the removal of a part by mechanical means should be supplied from the same source. But in all the cases where this has been done, either in the way of experiment, or for the cure of disease, the loss of substance, unless of small extent, has been found imperfectly repaired. For instance, after the operation of trepanning the skull, the aperture in the bone, though it becomes diminished in extent, is not altogether obliterated, and the newly-formed bone is not only smaller than the portion removed, but also thinner.

In the fore-legs of dogs and rabbits, there are two bones of nearly equal size, and so connected, that a large portion of one may be taken away without destroying the rigidity of the limb. There is here, therefore, a convenient opportunity of trying what can be done by the extremities of a bone for restoring losses of substance in its shaft. Experiments of this kind have accordingly been frequently performed on these animals, and the result has uniformly been, that when the portion removed exceeded an inch in length, there was a permanent deficiency of osseous substance, the ends of the bone being merely produced toward each other in a conical form, and connected together by a tough ligamentous texture. Sir A. Cooper has given representations of the results he met with; and I have met with others precisely similar.

Some of those pathologists who deny the ossific power of the periosteum, and claim the whole production of new osseous substance for the bone itself, have attempted to explain away the difficulties which

have just been stated, by supposing that, in cases of necrosis where a bone is formed, the old one, in consequence of the increased action preceding its death, may determine the effusion of organizable matter into the surrounding soft textures, which will serve as a matrix or foundation for the new shell, and be ready to take up the ossifying process so soon as it is communicated from the surviving extremities of the bone. That the process of reproduction may be accomplished in this way, I am not prepared to deny, but that it is not necessarily, or always so performed, will, I think, appear from the following case.

A girl, twelve years of age, strained her ankle in the month of March. Inflammation followed, extending up to the knee, and attended with violent fever. She was brought to the hospital, and placed under my care. Incisions were soon afterward made to evacuate a large collection of matter which had formed in the leg; and the bone being found dead, while the patient's strength was rapidly giving way, I amputated the limb above the knee five weeks after the injury had been received. The girl recovered, and is now well. In examining the limb to ascertain the extent to which the bone had died, I found that it was partially surrounded by the commencement of a new one. The shell had already acquired considerable firmness at some parts, but was not equally thick throughout, and did not seem fixed to the ends of the old shaft. This observation led to a very careful dissection of the parts concerned; and they are now before the Society. It will be seen that the tibia had died very nearly from end to end, and that the new shell inclosing it, has been formed in the periosteum. The new osseous substance may be observed at some parts in the form of small distinct scales. At other parts it looked as if it had originally consisted of separate portions, and been composed by their union. The periosteum connecting these portions to each other and to the extremities of the bone was not thickened beyond its natural condition; and where it covered the posterior surface of the tibia, though quite detached from the old bone, had not suffered any farther change.

There is here, then, an instance of a bone dying suddenly in consequence of acute inflammation, without any thickening having previously formed in its neighborhood, and nevertheless succeeded by the production of a new osseous shell, which evidently could not proceed from the old bone, and no less evidently depended upon an ossific process resident in the periosteum.

As Nature is not capricious or variable in her proceedings, I regard this case as sufficient of itself, without any farther evidence, to establish the ossific power of the periosteum. But, with the view of making the matter still more clear, I performed the following experiments:

I exposed the radius of a dog, and removed an inch and three-quarters of it together with the periosteum. At the same time I exposed the radius of the other leg, and removed a corresponding portion *without* the periosteum, which was carefully detached from it and left quite entire, except where slit open in front. Six weeks afterward the dog was killed, and the bones examined. In the one, from which a portion had been taken together with the periostium, the extremities were found extended toward each other in a conical form, with a great deficiency of bone between them, and in its place merely a small band of tough ligamentous texture. In the other, where the periosteum had been allowed to remain, there was a compact mass of bone not only occupying the space left by the portion removed, but rather exceeding it in thickness. This experiment, when repeated, afforded the same results.

I next exposed the radius of another dog, and separated the periosteum from the bone as in the former experiment; but then instead of cutting out the denuded bone, inserted a thin plate of metal between it and the periosteum. The edges of the membrane, and then those of the skin, were sewed together, and the wound healed kindly. At the end of six weeks I dissected the limb, and found a deposition of osseous substance in the periosteum, forming a bony plate exterior to the metal, and not connected with the old bone except by the membrane.

I lastly exposed the radius of a dog, and cut away the periosteum to the same extent that it had been merely detached in the experiment just mentioned, and surrounded the denuded bone with a piece of metal. At the end of six weeks I found a thick tough capsule formed inclosing the metallic plate, but having no osseous substance in it.

The evidence which has now been adduced seems to me sufficient for putting beyond all question the power of the periosteum to form new bone, independently of any assistance from the old one. I submit it, with deference, to the Society, in the hope that those members who have directed their attention to the subject will give it their dispassionate consideration, and either admit the opinion which it supports, or show the fallacy by which it has misled."

The treatment of necrosis seldom admits of active measures on the part of the surgeon at its early stage. Abscesses should be opened when they point. Sequestra ought to be assisted to escape, and the patient's strength supported by nourishing diet, and the other usual means. If the death of the bone is so sudden and extensive, that the new shell is not able, in the first instance, to support the strain of the muscles and weight of the limb, splints must be carefully employed until the process of ossification is advanced far enough to render them unnecessary. Finally, in case the patient proves unable to bear the

long-continued and exhausting exertion requisite for accomplishing the cure, he ought to be relieved by amputation.

SUPPURATION OF BONES AND CARIES.

It is only in the cancellated or spongy texture of bone that inflammation induces suppuration; the dense parts never taking it on unless they are previously expanded and loosened, in consequence of chronic inflammation. In the cancellated texture suppuration is frequently preceded by scrofulous deposition.

The matter may be collected either on the external surface, or in the interior of the bone. In both cases there is more or less excavation, effected by absorption of the bone concerned; and in the latter not only this effect ensues, but also an enlargement of the external shell of the bone, which thus forms an expansion, constituting what is called *spina ventosa*.

The most remarkable example of osseous expansion from the formation of matter with which I am acquainted, is here represented from a preparation in the Museum of the College of Surgeons of Edinburgh. It resulted from fracture of the tibia, and existed, progressively increasing, for many years, during which the patient was enabled to discharge the duties of an active life, by closing the orifice with a cork, shown in the cut, which he removed from time to time, when he found a convenient opportunity for pouring out the accumulated fluid.

Fig. 55.



The cavities which are formed in the cancellated substance of bones, especially in those cases where there has been a previous infiltration of scrofulous formation, frequently contain loose portions of the spongy bone, which have been deprived of vitality by the inflammation. When the matter escapes from a hollow of the bone by causing absorption of its sides, or when it is formed, in the first instance, exterior to it, the integuments are elevated, and at length give way, with great relief from the pain which was previously suffered. The abscess may then heal, like an ordinary one of the soft parts, or prove very obstinate, or permanently resist all means of cure.

It is impossible to foretell positively which of these events will ensue,

but experience and attention to the following circumstances generally enable the surgeon to form a pretty accurate opinion as to the result. 1. If the patient possesses a good constitution, and suppuration in the bone has been induced in consequence of inflammation caused by severe external violence, such as the wound of a joint, the prognosis may be favorable. 2. If the patient possesses a bad constitution, and the primary inflammation has commenced without any external cause, or one comparatively so slight as a bruise or a strain, which of itself is evidence of his constitution being unsound, the disease will probably be obstinate or incurable. 3. If the patient is an infant or child, and especially if he suffers from suppuration of several bones at the same time, there is a good prospect of an ultimate cure, but not without a very tedious process of recovery. 4. If the suppuration takes place in a bone that naturally possesses a dense texture, but which has been opened out by previous disease, it generally admits of cure more readily than when seated in one originally cancellated. Sir B. Brodie has lately directed attention to abscesses forming in the cancellated texture of bones, but more especially the tibia, and remaining latent for an unlimited duration of months or years, the chief symptoms being enlargment of the bone, with thickening of the soft parts, and deep-seated pain. In such cases he advises, on the ground of repeated success, the employment of a trephine to evacuate the matter; and this practice has been adopted with advantage. But this operation must not be resorted to without the greatest caution, since chronic periostitis is extremely apt to simulate the condition requiring its performance, and has misled practitioners, even of the most extensive experience, to trepan unnecessarily, with effects not less disastrous than even the death of the patient.

Whatever be the opinion entertained of the probable result of the case, after the matter has been evacuated, it ought always at first to be treated as if the sore were expected to heal. Free openings should be afforded to the discharge; stimulating washes, with moderate pressure afterward applied; and the patient's general health carefully preserved. If these means fail, some more powerful agents must be employed locally, such as the red oxide of mercury, or nitrate of silver; and if the patient's system seems to require it, an alterative course of mercury or iodine should be prescribed.

[Either chloride of zinc or the pure vegetable caustic will be found to be the best local applications; and as alteratives, nothing can be employed from among the known agents, equal in value to a combination of podophyllin, phytolacin, stillingin, and hydrastin. No mercurial preparation extant can equal this combination in efficacy, while it leaves no deposited source of irritation in the body.—R. S. N.]

Counter-irritation, such as that effected by the actual cautery, is

sometimes useful, and ought certainly to be tried, if the disease is attended with much pain. When the ulcer of the bone resists all means of cure, it constitutes what is called Caries.

The distinguishing character of caries is the same as that of cancerous ulcers in the soft parts, viz: obstinacy of the disease. The local symptoms vary considerably as to the quantity and quality of the discharge, the degree of pain, and the appearance of the orifice. The matter is generally thin and fetid, but sometimes possesses all the properties of perfect pus; the pain, for the most part, is gnawing and incessant, but often is hardly perceptible, or extremely severe. The orifice is usually small and callous, but occasionally exhibits large and flabby granulations. The disease has for the most part remissions more or less complete, and of considerable duration, in which the pain and discharge nearly or altogether cease, and the ulcer seems to be on the point of healing, or actually becomes covered with a cicatrix, which, however, is always thin and soft. But these amendments are only partial and temporary, being always followed by relapse, and there is no natural limit to the duration of the disease except the life of the patient, who, after months, or even years of suffering, becomes finally exhausted, either by the caries itself, or some other disorder which the irritation produced by the caries has excited. When a carious bone has been macerated, the diseased part is found excavated and rough, the cancellated texture being remarkably spicular, white, and brittle, so as to resemble a spongy bone which has been exposed to the action of fire. The surface thus affected is often of considerable extent, though frequently very small, even in cases of old standing, but the disease seldom reaches to a considerable depth. The field of the disease seems to be determined by the primary inflammation, and after being thus established, has little or no tendency to become larger. Around the carious part there is always an effusion of new osseous matter in the form of spines or tubercles, extending to a considerable distance, and greatly increasing the thickness of the bone. This new mass, which is no doubt produced in consequence of the irritation of the disease, like that formed to reunite fractures and supply the place of exfoliations, is characterized by compactness and smoothness when minutely examined, though on superficial inspection it appears rough and porous. The pores are apertures for the transmission of blood-vessels, but their form is circular and their edges rounded off, so that sharp edges cannot anywhere be perceived.

The newly effused bone may thus be readily distinguished from the diseased part, to the irritation of which it owes its origin. It is necessary also to distinguish between caries, and the excavation of the cancellated texture which is caused by absorption owing to pressure. In this case the bone presents the same appearance that it would do if

Fig. 56.



its external crust were removed by mechanical means ; and it possesses none of the whiteness, brittleness, or spicular surface observed in caries. As this difference can hardly be ascertained until after maceration, a more useful distinction is afforded by the history of the case, and whenever the excavation is plainly referable to pressure, no apprehension need be entertained of caries. It is thought by many, that deep-seated collections of matter, if not evacuated early, may occasion caries; but when this morbid state of bone is connected with deep suppuration, it will always be found to have been the direct result of the primary inflammation. That mere pressure is not sufficient to produce caries may be learned from the want of any morbid disposition in the sides of the apertures which are formed by absorption to evacuate matter confined in the cavities of bones. In the living body the carious surface is generally more or less completely covered with unhealthy granulations, which often possess very considerable firmness, and render the discovery of its extent, or even existence, by no means easy. The disease occurs at all ages, but commences most frequently in the early periods of life. It is most frequently met with in persons disposed to scrofulous action, and often follows suppuration in bones which have been the seat of deposits proceeding from that morbid action.

The treatment of caries is to be conducted on the same principles as that of cancer, and consists in the use of means which have the effect either of destroying the life of the morbid part, or of removing it at once from the system. There is this difference, however, that there being no malignant tendency to take on the same diseased action in the neighboring parts, it is not necessary to remove any of them, except in order to gain access to the seat of the evil. Notwithstanding this favorable circumstance, it is found extremely difficult to eradicate the disease by depriving the part affected of its vitality. The bone usually lies at a considerable depth ; the caries, though it seldom penetrates deeply into its substance, generally occupies an extensive and irregular surface; and the effect of agents used with the view of killing the morbid part is necessarily much weakened by its humidity. The concentrated mineral acids—the nitrates of silver and mercury—the red oxide of mercury—and the actual cautery, are considered the

best means for the purpose. In using them the bone affected ought to be freely exposed by a crucial incision, and then dried as well as possible, after which the caustic or cautery selected should be applied so as to produce a decided effect. The fluid caustics should be applied by means of a piece of lint soaked in them; the solid ones should be rubbed on the part, or, if they are in the form of a powder, as the red oxide of mercury, laid on it in substance; the cautery should be of a spherical or ovate shape, it must be pressed down firmly, and be succeeded by two or three others until the whole morbid surface has been subjected completely to their action. The effect of all these applications, however carefully employed, is very superficial, and it is extremely difficult, if not impossible, to ensure their operation on the whole surface of the diseased part. They, therefore, always require to be frequently repeated, and generally prove quite inadequate to destroy the disease, unless it is very limited and accessible; and it is even not improbable that some of them, as the actual cautery, may occasionally make the matter worse, and extend the disease to the neighboring bone by exciting inflammation in it. For these reasons excision ought to be preferred to caustics for removing the carious bone; and if the part affected be within reach, which can always be ascertained previous to commencing the operation, it may by this method be surely and thoroughly eradicated at once. If the disease is superficial, and of small extent, it is easily scooped out with a gouge, the toughness and compactness of the sound bone distinguishing it from the morbid portion. If extensive and deeply seated, it is best removed by taking away the whole of the articulating extremities concerned, as will be explained hereafter when the diseases of the joints are considered. When the situation of the caries prevents it from being cut out, amputation ought, if possible, to be performed; and if this be impracticable, the disease will sooner or later prove inevitably fatal.

[I have altered Mr. Syme's arrangement somewhat, by introducing his operations for diseased joints, along with amputations in general, in a former chapter. It is one of the features of Eclectic Medical Science, to insure a perfect cure. Mr. Syme admits, that the ordinary local treatment is often worse than useless, and entertaining the same view, I would recommend excision by all means.—R. S. N.]

EXOSTOSIS.

The term Exostosis is employed to denote various morbid conditions of the osseous system differing materially from each other, and has consequently occasioned great confusion. In order to avoid this, it ought to be confined in its meaning to imply an unnatural growth of bone. Exostosis, in this sense, exhibits three remarkable varieties in respect of its structure being sometimes solid at other times hollow,

and also not unfrequently spicular or foliated; that is, composed of radiating points or plates. The first of these kinds of exostosis exists independently of any other disease, but the two others are connected with and dependent upon different morbid formations, along with which, they may more properly be considered.

The first, which may be called the simple or solid exostosis, consists of a solid mass of osseous substance growing out of a bone naturally belonging to the skeleton. It is sometimes thin and flat, rising gently from the surrounding surface, and not causing any sharp projection, when it is named a Node, an appellation which is also used to designate a similar swelling dependent on chronic thickening of the periosteum. In other cases, it forms an abrupt projection, the neck of which, is usually narrow in proportion to the extremity.

The substance composing such excrescence is of various solidity, being sometimes open and spongy, at others, extremely dense and compact, and occasionally more like ivory than bone. The bones most frequently thus affected, are the femur, tibia, lower jaw, and distal phalanx of the great toe; but there is no bone in the body exempt from it, though those of dense structure, are certainly the most liable to it. It may appear at any age, but, for the most part, does so about the time of puberty.

The inconvenience which this sort of exostosis occasions, depends very much upon its situation. Generally, while the growth is enlarging, pain and annoyance are experienced from obstructed function of the neighboring parts; but when it ceases to increase and becomes dense, which it usually does sooner or later, the irritation of its presence becoming habitual, is no longer troublesome. The treatment, therefore, seldom requires to be active; and nothing more is usually requisite than to protect the limb, or part affected, from the irritation of motion or pressure, so long as the exostosis is enlarging. Should it prove permanently or seriously troublesome, excision affords easy and effectual means of relief. For this purpose, many ingenious contrivances have been recommended, but nothing answers so well as the cutting-pliers, when the neck of the tumor is not very thick; and the common saw, when it is of too great breadth for being divided with the former instrument. It has been thought necessary to perform amputation of the great toe, on account of the exostoses which are apt to grow at the side or extremity of the nail; but this proceeding is equally severe and unnecessary, as excision of the tumor may be easily effected, and is not followed by relapse.

The hollow exostosis depends on the expansive effect of fluid or solid formations within the bone, as in this very remarkable case, of which the preparation is in the Anatomical Museum of the University; and the osseous substance may be regarded as devoid of any morbid

Fig. 57.



disposition, so that if the contents were removed, it would contract to its ordinary dimensions. The same observations apply to the spicular or foliated exostosis, which is always found connected with some source of irritation, and is to be looked upon rather as a consequence than a part of the disease. The causes usually concerned in giving rise to this production, are morbid growths, ulcerations in its neighborhood, and exfoliation from its internal surface.

FIBRO-CARTILAGINOUS TUMOR OF BONE.

It is usual to comprehend all the solid tumors of bone, the consistence of which is less hard than that of the bone itself, under the title of Osteo-sarcoma. But as this leads to much confusion, it is better to divide the softer tumors of bone into the fibro-cartilaginous, and medullary-sarcomatous, which differ essentially in their nature and consequences.

The fibro-cartilaginous tumor, when occurring in bones, possesses the characters which have been already described in the general account of this kind of morbid growth. Its color is white, gray, or yellow; its consistence nearly approaches that of cartilage; and it has often interspersed through it small cysts of transparent fluid. It generally originates in the central part of the bone affected, and gradually enlarging, expands the surrounding shell, which still preserves the properties of sound osseous tissue, though sometimes singularly altered in shape. The tumor is productive of little inconvenience except from its size; but, on this account, is often a source of great annoyance and distress; as when the lower jaw, humerus, metacarpal bones, or phalanges of the fingers are affected. There is reason to believe, that if the fibro-cartilaginous substance could be completely eradicated, the bone would resume its natural shape and size; but as its cellular or honeycomb-looking structure, when expanded by disease, renders such an extraction impracticable, the only remedy is removal of the bone affected; and this operation, however disagreeable in some situations

from the deformity occasioned by it, may at least be performed with a favorable prospect of effecting a permanent cure.

MEDULLARY-SARCOMATOUS TUMOR OF BONE.

Medullary-sarcoma occurs in bones perhaps more frequently than in any other tissue of the body. It commences sometimes immediately under the periosteum, and causes an excavation in the surface of the bone, around which more or less osseous matter is effused; at other

Fig. 58.



times, it begins in the interior, springing apparently from the medullary membrane, and then expands the bone into a shell, or by inducing absorption, causes a perforation, through which it issues, and swells into an external tumor, or it opens out the bone into beautiful needles, or plate-like processes, radiating from the central seat of the disease; or lastly, it may simply occupy the place of the bone. But whatever may be the diversity in this respect, the morbid degeneration always exhibits its characteristic features. There is usually great pain from the first, and often for a long while before any external swelling is visible. The patient loses flesh, and indicates, by his anxious expression of countenance, the presence of a malignant disease. The tumor, though at first seldom so soft as when originating in the less dense tissues of the body, in its progress becomes softened, and requires, at least in some parts of its extent, a consistence so nearly approaching that of a fluid, as to render the discrimination from it extremely difficult. Then the veins enlarge; the integuments inflame; ulceration ensues; fungous excrescences protrude; and the patient sinks under the exhaustion which results from profuse discharge of ill-conditioned matter or blood. The disease attacks at every time of life, and in both sexes; but seems, on the whole, most frequent between twenty and forty years of age. The only remedy is amputation; and unless this be performed early, before the constitution of the patient is much injured, and freely, so as to remove the whole of the affected bone, it will, in all probability, prove of little permanent benefit.

[It should be the practice, though it is not commonly so, to endeavor, by alterative medicines, and the irritating plaster to induce the ab-

sorption of these tumors of the bone in their incipiency. If this is not done, then excision of the diseased parts should be performed.—R. S. N.]

CYSTIC TUMOR OF BONE.

The bones sometimes, but very rarely, with the exception of the upper and lower jaw, become the seat of cystic formations, of which the cut on page 393 affords an example in the case of the thigh-bone. The swelling is generally not attended with much pain, and at its commencement may be mistaken for a solid exostosis, or cartilaginous growth; but as the cysts enlarge and approach the surface, the thinness of their parietes betrays the nature of the case. This disease occurs most frequently in the earlier periods of adult age. So long as it retains the characters of the cystic tumor, it may be regarded as free from any malignant action; but this morbid structure seems to have a disposition to change into medullary sarcoma. The best mode of treatment is early and free removal of the bone affected, if puncturing the tumor, or laying it open by free incision, has not the effect of curing the disease.

RACHITIS OR RICKETS.

By Rickets is understood a morbid state of the osseous system, in which the bones are soft and flexible, being converted into a substance more like leather than bone; having a brown color and cartilaginous consistence, with no appearance of marrow, but numerous irregularly circular and oval cells, even in the parts naturally most compact, containing a brownish-red fluid. The disease does not directly cause pain, but occasions great inconvenience by allowing the bones to bend under the weight of the body, and contraction of the muscles. It is accompanied with weakness and derangement of the whole system, the symptoms of which are a pale and sickly countenance, tumid abdomen, flabbiness of the muscles, and unhealthy evacuations. The earliest perceptible alteration of the bones is in the wrists, which become preternaturally large, and are apt to excite the suspicion of fracture. It is confined to the period of childhood, and seldom begins later than the second or third year of age. It affects chiefly the offspring of young or unhealthy parents, and occurs most frequently in cold moist climates. It terminates either in death or in a return to health, after months or years of duration. Contrary to what might be expected, rickety bones are readily broken by slight degrees of violence, and their reparation in such cases is effected by cartilage, so that the limb remains moveable, as if it had a false joint at the injured part. When the bones regain their healthy nutritive action, they become as hard and unyielding as usual, retaining, however, the curvatures which have taken place during the softened state. The new osseous substance which is deposited during their subsequent growth, occupies chiefly the concave

side of the arches into which they are bent, where it has most effect in strengthening their power of resistance, and gives them a remarkable flattened shape.

Rickets used to be ascribed to the operation of a morbid acid humor pervading the system, and the remedy consequently consisted in liberally supplying the patient with alkaline and earthy preparations, in order to neutralize this acidity, and replace the defective earth of the bones, which was supposed to have been removed by its chemical agency. The disease is now referred, more consistently with scientific pathology, simply to disorder of the nutritive action of the osseous tissue, and the means employed to correct it, are merely those which tend to strengthen the system in general, while every prudent precaution is taken to prevent the bones from suffering distortion, so long as they remain exposed to it by their softness and flexibility.

With these objects in view, the patient ought to be frequently put into a warm-bath, and every day have the whole surface of the body subjected to friction. He should be warmly clothed, and, if possible, removed to a dry situation, sheltered from the cold. His diet must be moderate, easily digestible, and nourishing; and he should abstain from all medicine, except what is required to maintain or excite the intestinal secretions. While the bones are in a yielding state, exercise in the erect posture may cause curvature and distortion, especially of the bones composing the trunk and inferior extremities; the patient ought, therefore, to be debarred from walking, running, etc., and encouraged to creep and roll upon the floor or on the ground in the open air. Should the limbs unfortunately have been bent through neglect or injudicious treatment, they may often be straightened by the gentle and continued use of splints or other apparatus.

[Rachitis will seldom or never occur if proper attention is paid to the general health of the child. Of course, if the child is the offspring of diseased parents, it will be liable to the disease; yet if proper care be bestowed on the general health of the child, it will be seldom seen in our western States.—R. S. N.]

MOLLITIES AND FRAGILITAS OSSIUM.

By Mollities Ossium or Malacosteon is understood a general disease of the bones, in which they become extremely soft, much more so than in rickets, so that in its advanced stages there hardly remains any trace of the osseous texture, and the periosteum incloses merely a yellow or brownish mass of lardy consistence. This affection is attended with excessive and almost incessant pain—is almost confined to females—occurs chiefly at the middle period of life—and though often very slow in its progress, advances until the patient dies.

There is no effectual remedy for this dreadful malady, and its treat-

ment consists in the use of means proper for palliating the patient's sufferings, of which the different preparations of opium are the best, and supporting the general health, for which purpose sea air seems to have most influence.

Fragility or unusual facility of being broken, naturally leads to the idea of a redundance in the earthy constituent of bones; and a certain degree of it depending on this cause is observed in old people; but the condition which is generally understood to be denoted by this title, and in which the proneness to breaking is so great that fracture is caused by the slightest external violence, or even by the action of the muscles in effecting the ordinary movements of the limbs, is a state of preternatural softness instead of increased density. Rickets, malacosteon, and the medullary-sarcomatous degeneration, all occasionally render the bones more liable to be broken; and fracture being sometimes the first obvious effect of the diseased action, is not only thought to be the cause that induced it, but also chosen as the characteristic feature for its designation. A remarkable degree of fragility has been observed in the advanced stage of carcinomatous disease.

[Fortunately Mollities Ossium is a rare disease—no really efficient plan of treatment is known; those affected with it being almost always carried off by the disease. The treatment must be palliative, and among the palliative remedies I would suggest the use of the cypripedin and scutellarin in alternation with phosphate of iron.—R. S. N.]

DISEASES OF THE SPINE.

There are two morbid states of the spinal column which occur so frequently, and are attended with such important effects on the system, that they require to be considered by themselves. These are inflammation, and some of its consequences, with or without curvature, and curvature without inflammation.

When inflammation occurs in the vertebræ, it is seated in the spongy texture which constitutes their bodies, and is indicated first by a dull gnawing pain at the part, which is aggravated by pressure and motion; then a slight degree of swelling generally appears so as to make the spinous processes of the affected vertebræ appear more projecting than usual; the patient loses his appetite and strength; becoming dull and listless, and preferring the horizontal posture; his inferior extremities are reduced in bulk, and affected with numbness and rigidity; whence the gait is awkward and vacillating, the legs frequently crossing each other, while the trunk is held peculiarly erect and rigid, to protect the diseased part from motion. As the disease advances, the patient sometimes loses the use of his limbs entirely; and, in addition to his other complaints, is generally distressed by an uneasy feeling at the pit of the stomach, and a painful sense of

constriction round the chest, in the region of the diaphragm. Suppuration usually ensues, and the matter is either confined to the neighborhood of the bone affected, or descends in the interstices of the soft parts so as to present itself lower down. When the dorsal vertebræ are affected, it generally points in the loins, and constitutes a lumbar abscess; when the lower dorsal or the lumbar vertebræ are concerned, it for the most part passes down along the psoas muscle, and appears in the groin, sometimes above, but more frequently below Poupart's ligament, when it is named a psoas abcess. The matter, in order to point above Poupart's ligament, must perforate the abdominal muscles and fasciæ, through means of absorption, which happens generally by a small aperture; the pus thus comes to be quite superficial, and diffused under the skin, from which circumstance the abscess may be erroneously regarded as entirely subcutaneous. It must be observed, that though chronic abscesses in the loins or groin most frequently proceed from diseased bones, they may exist independently of such sources, just as in other parts of the body.

When the pus ceases to be confined near the bone, and begins to drain away from it, the patient generally experiences great relief from his complaints. The pain becomes very much lessened, and the use of his limbs is often in some measure or altogether regained. But this amendment is usually accompanied by a serious change to the worse in another respect; since the vertebral column is apt to bend under its superincumbent weight, when weakened by the destruction of bone and intervertebral cartilage which attends the suppuration. The curvature in this case takes place forward, and being confined to a small extent of the spine, causes an acute projection behind, so that one or more of the spinous processes appear to be dislocated backward. This change of shape does not take place, either when the extent of the disease is small in proportion to the size of the bones in which it is seated, or when it is so great that the patient is constantly confined to the horizontal posture; but the latter circumstances are comparatively rare in proportion to those which favor the occurrence of curvature. The surface of the abscess either heals with approximation and consolidation of its parietes, the vertebræ concerned appearing as if run into one mass, or a state of caries remains, and gradually wears out the patient's strength.

This disease may happen at any period of life, but is by far most common in children from two to eight years of age. In adults it generally occupies a small part of the bone, and proves extremely obstinate, or rather always incurable, at least with such few exceptions as hardly deserve to be mentioned. In childhood it usually engages the whole substance of two or three adjoining bodies of the vertebræ, which on dissection are found almost entirely wasted away,

together with the intervertebral substance, portions of dead bone and pus occupying the cavity.

The disease is usually ascribed to twists or blows; but as these injuries are seldom thought of until long after they are alleged to have been received, and not before the symptoms attract attention, there is much reason to discredit their effect in exciting the morbid action. In children, there is reason to believe that the first step of the morbid process is the deposition of scrofulous substance in the cellular interstices, or on the surface of the bones. It would seem that in adults the disease is liable to be excited by venereal excesses.

In conducting the treatment of this acute curvature, as it is generally named, surgeons proceeded formerly in the belief that the primary evil consisted in displacement of one or more of the vertebræ from violence; that the pain and loss of voluntary motion depended on pressure caused by the dislocated parts of the spinal marrow; and that the disease of the bones was not only caused, but kept up by the irritation proceeding from their unnatural position. Their practice, therefore, consisted in the use of mechanical contrivances for rectifying the displacement. The inefficacy and danger of such a mode of proceeding must be obvious to every one acquainted with the true condition of the bones, which having their substance destroyed more or less extensively, though separable by force, must resume their situation as soon as it is removed. And if the vertebræ are much weakened or partially united, they will be very apt to suffer such fracture or disjunction as may render the limbs below permanently paralytic, or prove immediately fatal.

Mr. Pott, observing that curvature of the spine from rickets, though productive of the most extreme distortion and deformity, was not attended with palsy; and that the palsy accompanying the disease in question did not resemble the state which is induced by pressure on the spinal marrow, the muscles of the limbs being not soft and flaccid, but rigid and tense, concluded that the curvature was an effect, and not the cause of the disease, which he thought might more reasonably be referred to inflammation seated in the bodies of the vertebræ, and causing more or less irritation in the neighboring spinal marrow.

With this view of the matter he used counter-irritation by means of issues opened with the caustic potash, as early as possible, in order to subdue the inflammatory action and interdicted the erect posture, as increasing the irritation. Mechanical contrivances do not afford the diseased spine nearly the same repose which is obtained from the horizontal posture, and frequently occasion the greatest mischief, by pressing injuriously on different parts of the trunk, as well as by inducing the patient to indulge in exercises which the diseased spine cannot bear with impunity. There can be no doubt as to the soundness of

the principle which constitutes the foundation of Mr. Pott's practice; but it certainly has been applied too indiscriminately. In the common case which commences in scrofulous deposition in the substance, or on the surface of the bones, and insidiously advances through its suppurative stage, no advantage can be derived from counter-irritation, which, on the contrary, may prove injurious by exhausting the patient's strength. In the case also, occasionally, though not so frequently met with, where the spine forms an acute projection posteriorly, becoming bent almost to a right angle, with little pain and no suppuration, the bodies of the vertebræ seeming to be simply absorbed, so that the remaining ring or processes are consolidated together, there is no use in opening issues. It is only when the pain and other symptoms that have been mentioned denote the existence of inflammatory action, that the caustic or actual cautery should be employed. The latter agent seems greatly preferable, and is to be applied longitudinally to the extent of a few inches on each side of the affected part, except when the neck is concerned, in which case the middle line may be selected for the purpose.

This disease occasionally affects the first or second upper cervical vertebra, with the corresponding part of the occipital bone. The symptoms, in the first instance, are the same as those which have been already described, consisting of deep-seated pain, felt chiefly at night, and aggravated by motion. But, owing to the importance of the portion of the nervous system which lies within the direct influence of the disease, when it is thus situated, namely, the lower part of the *medulla oblongata*, and the mobility of the joints concerned, the patient's sufferings are extremely severe. In eating and speaking he feels darting pains through the neck. In changing his position, he keeps the head perfectly steady, and employs both his hands to assist the muscles in preventing any rotation or flexion of the affected vertebræ. He loses his appetite and strength; complains of almost unremitting and intolerable nausea; and exhibits, by a peculiarly anxious and unhappy expression of countenance, that he labors under a disease of the most agonizing kind. Loss of voice, difficulty of breathing, convulsions, and palsy, occasionally supervene; the head generally suffers more or less distortion to one side, in consequence of the bone giving way under the ulcerative process; and at length, after months or years of misery, the patient dies, either gradually, from mere exhaustion, or suddenly, from dislocation of the odontoid process of the second vertebra, which, becoming detached from the occipital bone, presses backward on the *medulla oblongata*. If an abscess forms, it is seldom evacuated previously to the patient's death, and sometimes opens into the pharynx.

The subjects of this disease are mostly children and young adults.

The treatment requires rest of the head, together with counter-irritation, effected early and powerfully by the actual cautery; and practitioners ought to beware of mistaking the first indications of this destructive disease for slight rheumatic ailments, deserving of no particular attention. The preparations in museums, prove that the cure of the disease, though perhaps very rare, is not impossible.

The other disease of the spine which requires to be particularly considered, on account not of its danger to life, but its frequency and important consequences in respect to the patient's appearance and comfort, consists merely in curvature, without any specific or general morbid affection of the osseous system. It is named the Lateral Curvature; its direction being very rarely from before backward, and almost invariably from side to side. It occurs chiefly between the ages of seven and seventeen, and with few exceptions, is confined to the female sex. It generally comes on insidiously, increases progressively, and, terminating at a more or less advanced stage, leaves the patient permanently disfigured in a proportionate degree. The part of the spine principally affected, is the dorsal portion, which bending to one side, almost always the right one, makes the corresponding scapula and shoulder seem larger and more prominent than usual. As the disease advances, a counter-balancing bend in the opposite direction takes place in the lumbar region, causing the hip concerned to appear enlarged. When the spinous processes are traced downward from the neck to the sacrum, the alternate bending in their course may be readily observed. As the curvature continues to increase, the distortion becomes more and more apparent; the trunk is shortened and looks compressed; the ribs are approximated from side to side, and protruded forward to increase the capacity of the contracted thorax, which thus has its shape entirely altered, and is widest from before backward. However far the disease may proceed, the limbs and pelvis remain free from any participation in it.

In ascertaining the cause and nature of this curvature, the following circumstances, which attend its commencement, must be carefully recollected: 1. It occurs almost exclusively in females, who devote a large portion of their time, during the period when the morbid disposition exists, to the pursuits usually followed in undergoing a fashionable education, or to some sedentary occupation, which does not require or permit much bodily exertion. 2. It usually affects most seriously those individuals who possess a slender frame, or one characterized by indications of a phlegmatic temperament, their bodies, though large and bulky, being pale, flabby, and prone to all morbid states depending on weakness of action. 3. Other things being equal, it occurs most certainly, and proceeds most rapidly, when the trunk is habitually maintained in a bent position.

The predisposition to the disease, therefore, appears to be constitutional weakness, and its exciting causes, circumstances which increase the weakness of the spine particularly, and promote its bending by the figure they make it assume. The strength of the spine depends partly upon the bones, and partly upon the muscles composing it; and it is probable that the former are chiefly affected by the predisposition, while the latter are influenced more by the exciting causes. All muscles require frequent exercise for the preservation of their strength; but, during the occupations of their drawing, playing, sewing, etc., while the extremities are either constantly employed, or, at all events, unrestrained in their movements, the trunk is not only held perfectly steady in one position, often a curved one, but is also compressed with the rigid articles of dress which are used under the erroneous expectation of improving the shape. The muscles of the back, therefore, becoming extremely weak, and, indeed, as may be learned by actual examination, almost completely absorbed, are no longer able to restore the erect position of the spine when bent by the weight of the head and superior extremities, or by the occupation of the patient. It consequently assumes a permanent curve; and then the predisposition, which depends on a softened state of the bone, acts with full effect; because the more the column bends, the longer levers are afforded to the superincumbent pressure. As the distortion increases, the viscera of the thorax and abdomen are more and more compressed and displaced, their functions suffer corresponding derangement and the whole system becoming disordered, the bones even less properly nourished than before, lose still more of their resisting power. Should the patient unfortunately, during this process, fall into the hands of a machine-maker, who attempts to prop up the weak and twisted spine, by means of iron frame-works, the morbid alterations which have been described will be accelerated; for all such contrivances must prove either insupportable to the patient, or inefficient in straightening the spine; and granting even that they could accomplish this, they would still labor under the great objection of confining the movements of the trunk, and preventing the muscles from obtaining that exercise which is essential to the recovery of their strength. The result would be not more satisfactory, if the practitioner were to go to the opposite extreme, and, regarding the muscles as the sole seat of the disease, attempt to strengthen them, by enjoining long-continued exercise in the erect posture, or, still worse, recommending a weight to be carried on the head, in order to render their actions in balancing it more energetic than usual. Such practice, however useful in preventing curvature, must manifestly tend to increase it when once commenced.

In the management of persons predisposed by their age, sex, temperament, or constitutional make, to this disease, every means ought

to be used for strengthening the system in general, and the trunk in particular. All long-continued and constrained positions must be interdicted — frequent exercise of such kind as calls into action the muscles of the trunk should be enjoined. The use of stays, corsets, and every rigid article of dress, however designated, must be strictly prohibited. If curvature has already taken place, it is evident that the first step toward reparation must be relieving the weak and bent spine from pressure. The only mode of effectually accomplishing this is to make the patient assume the horizontal posture, which can be done without any great hardship, if a smooth, well-stuffed sofa is provided, instead of the floor or a board, which is sometimes used for the purpose. The warm-bath ought to be employed, if possible, two or three times a week, and the back should be rubbed with some stimulating liniment for twenty minutes every night and morning. When the curvature begins to diminish, the patient may rise occasionally for a few minutes, and exercise the muscles by some suitable employment, which ought never to be continued after the slightest feeling of fatigue is experienced. By persisting in this system, the disease will certainly be arrested in its course, the distortion, if not very great, will be removed, and the worst cases will be considerably improved.

[Curvature of the spine is very common in the United States, and especially in cities. Various modes of treating the disease are practiced, but of all the plans that of staying and lacing up a patient is attended with the worst consequences. I have in several cases succeeded with mechanical appliances in connection with the internal use of tonics and stimulants, where, I am certian, cures could not have been made without them. On this disease Mr. Syme is so full and direct that I shall only suggest, that the patient be put on a strong tonic course of treatment, and that the irritating plaster be greatly relied on. These means, together with proper exercise of the muscles of the back, and avoidance of the exciting causes, will commonly be found sufficient to relieve the patient.—R. S. N.]

CHAPTER XIV.

JOINTS.

SPRAINS AND BRUISES.

The ligamentous tissue is not liable to pain excited by the ordinary stimuli which occasion it in other parts; but though insensible to cutting and tearing, it suffers severely from being overstretched, in conformity with the general law, that the sensibility of parts bears some relation to their use in the animal economy. The articular cartilages and lining synovial membrane again suffer from violent compression. The symptoms and effects, primary as well as secondary, which proceed from these two sources, are very similar. Joints of the ginglymoid or hinge-like structure, and those of the arthrodia kind, such as the tarsal and carpal articulations, are exposed to the first-mentioned injury, while the ball and socket-joints, though nearly exempt from it, are subject to bruises from their respective surfaces being squeezed together.

Both strains, or sprains as they are called, and bruises are attended in the first instance with severe sickening pain, and more or less complete inability of exercising the joint. To these symptoms succeed swelling, tension, and, if the joint is superficial, discoloration from ecchymosis, and not unfrequently inflammation, particularly if the patient possesses a scrofulous or otherwise irritable constitution. The inflammation, when chronic, leads to thickening and adhesions of the articular apparatus, which occasion deformity and lameness, or morbid degenerations of the same part, which frequently end in the destruction of the joint; when acute, it tends to suppuration. The immediate effects of these injuries are always distressing, and their secondary consequences, though not certainly serious, are generally inconvenient, and often destructive of the limb. Such accidents, therefore, ought always to be treated with attention, so that nothing may be neglected in any way calculated to guard against bad consequences to the joint.

The means that afford most relief from the pain directly caused by the injury, consist in the application of hot fomentations and the preservation of perfect rest. The ecchymosis is often considered a warrant for leeching or cupping; but as has been already explained, the blood which produces the discoloration being effused from the vessels, cannot be withdrawn in this way, and must be removed by absorption. If symptoms of inflammation come on, blood should be abstracted freely

both locally and generally, and the other means employed that will be mentioned when the inflammation of joints is considered.

[Fomentations perseveringly applied will do away with the necessity of blood-letting, and the irritating plaster will be found more efficient than the blister.—R. S. N.]

After the injured part has ceased to be painful on pressure or motion, and remains merely swelled and stiff, it ought to be compressed with a bandage, and at the same time have some stimulating ointment or lotion applied to promote absorption. Blistering, warm pumping, the vapor-bath, friction, and gentle, but frequently repeated exercise, are useful at the same time, and with the same view.

DISLOCATION.

By Dislocation is understood the displacement of the respective surfaces of an articulation. The dislocation may be partial or complete; and also simple or compound, in the same sense of these terms as when they are used with reference to fractures. It is simple dislocation only which will be considered under this section, as those which are compound may be arranged more conveniently under wounds of the joints.

The joints least subject to strains are most readily dislocated, since the mobility and looseness of ligamentous connection which protect them from the former injury expose them to the latter. The circumstance of having been formerly dislocated increases the predisposition. The causes of dislocation are: 1. External violence; 2. Inordinate muscular action; and, 3. Diseased alteration of the articular apparatus. The displacements which proceed from the last of these causes are named spontaneous dislocations, and will be considered along with the diseases which give rise to them.

The process of dislocation usually consists of two stages or acts; there being first the displacement of the articulating surfaces which results directly from the violence that causes the accident; and then a farther separation of them by the action of the muscles which formerly held the bones together, but now pull them past each other. These two steps are sometimes designated by the names of primary and secondary dislocations.

Of the symptoms of dislocation, the most constant and characteristic one, especially as a distinction from fracture, is immobility or fixture, when motion of the limb is attempted either by means of its own muscles or by an external force, which depends upon the unnatural position of the articulating extremities of the bones, and the contraction of their surrounding muscles. The limb is generally shortened, but sometimes it is lengthened, and when the latter is the case there cannot of course be any suspicion of fracture. There are

also, attending the accident, deformity from the altered situation of the bones, pain or numbness from their pressure on the muscles and nerves, and swelling with coldness from obstruction of the blood-vessels.

The treatment of dislocation consists in reducing or replacing the articulating surface which has been moved from its proper position; in doing which it is necessary to counteract the forces that caused the two acts of the removal. This is effected by first extending the limb, so as to draw back the bone to the point where the muscles began to operate in producing its displacement; and then urging it in a direction opposite to that in which the external violence primarily acted. These steps in the process of reduction, which are named extension and coaptation, have sometimes an equal share in its accomplishment, but more frequently one or other of them is chiefly used. In ball or socket-joints the first, and in hinge-joints the second is chiefly exercised.

The dislocated bone ought generally to be extended in the direction which it has assumed in consequence of the displacement. The force for this purpose may be applied so as to act either directly on the bone itself, or on a part of the limb separated from it by one or more articulations. It has been objected to the former mode, that it causes compression of the muscles opposed to reduction, and to the latter, that, by keeping the limb straight, it is still more adverse to yielding of the muscles. It does not appear, however, that any practical inconvenience is experienced in either of these ways. The former method is on the whole more convenient in most cases, and is almost always employed in this country. In order to make extension effectually, it is necessary to have counter-extension exerted on the corresponding surface from which the bone has been dislocated, viz: the one nearest the center of the body; and the more directly it is subjected to the power employed for this purpose, the more perfectly will the object in view be attained. The force employed for extension may be either simply the manual strength of one or two stout assistants, or this increased by the power of the pulley. In all cases of dislocation, except perhaps sometimes where the hip-joint is concerned, mere manual extension is sufficient, and it ought, therefore, in general, to be preferred, being more readily obtained and also more easily managed than the pulley.

[The surgeon cannot be too cautious in manipulating a dislocated bone; careless or injudicious handling may cause a fracture, and thus place the life of the patient in imminent danger. Such cases have occurred often, and the surgeon should bear in mind everything which could act detrimental to the welfare of his patient.—R. S. N.]

The best bandage for applying the extending force is a skein of

worsted or a folded shawl which must be securely fastened to prevent it from slipping in the process. The best noose for this purpose is either the *clove-hitch*, as it is called by sailors, or another, which is preferred by the French surgeons. It is executed by placing the band across the limb, and then drawing each end of it through the opposite loop.

The strength of the patient's muscles may be weakened by bleeding, the warm-bath, tobacco injections, and the tartrate of antimony, given in solution in small doses frequently repeated.

[Lobelin, veratrin, gelsemin, either in combination or alone, will be found better relaxants.—R. S. N.]

Of these means, the first and last mentioned are the most convenient, but it is seldom necessary to employ either of them. The involuntary resistance may also be lessened by preventing fixture of the thorax which being the central point of attachment, directly or indirectly, to all the muscles of the body, is instinctively rendered immovable whenever any strong effort is to be made. But if the patient is obliged to speak, this cannot be done, and consequently the opposing force is diminished. With a similar view it is sometimes advantageous to effect the extension suddenly, when it is not expected by the patient; but unless it should seem practicable to accomplish the reduction in this way instantaneously, the limb ought to be extended slowly and steadily, since the effect of the stretching force in subduing the contractile energy of the muscles depends more upon its duration than its degree.

Coaptation is more or less required according to the resistance which is opposed to the reduction by the shape and situation of the articular surfaces. As has been already remarked, it is generally least useful in the ball and socket-joints, and of most advantage in those of the hinge form. In the former, it is sometimes not required at all; and in the latter, it is occasionally sufficient of itself to accomplish the operation.

After the dislocation is reduced, the joint ought to be protected against the operation of those circumstances which tend to renew the accident. It ought to be kept perfectly quiet, and frequently fomented, to allay the pain and irritation consequent on the laceration and bruising of the various injured parts. It might be expected that the immediate pain, as well as danger of consecutive inflammation, would be greater in dislocation where the ligaments are torn, than in strains where they are only overstretched. But this is not the case, and though inflammation, both acute and chronic, may no doubt result from the former accident, it is seldom followed by any serious bad consequences of this kind.

When the dislocation is not reduced, the bone acquires adhesions to the neighboring parts round the margin of its articular surface, and

by its pressure often induces absorption of the surface it comes to act on, so that a cavity is formed for its reception, and a sort of new joint produced, which enables the patient to regain considerable use of the limb. While this process is going on, the old articular hollow gradually contracts, and ultimately becomes obliterated; so that, if the bone were displaced from its new situation, it could not be returned to its original one. The time that may elapse before reduction becomes impracticable, varies with the age of the patient and the nature of the joint concerned, from two or three weeks to as many months. It is longer in old people than in young, and in dislocations of ball and socket-joints than in those of hinge-joints.

SHOULDER-JOINT.

The head of the humerus may be dislocated downward, forward, and backward. The first of these displacements is the most common, and happens more frequently than the dislocation of any other joint. The accident is caused by external violence proceeding from falls on the hand or elbow, or blows on the shoulder, while the arm is separated from the side, and also, though rarely, by sudden violent contractions of the *pectoralis major* and *latissimus dorsi*, the limb being in the same position. In some rare cases it has been observed to occur during the epileptic convulsion. The capsular ligament is necessarily torn, and the head of the bone rests upon the neck of the scapula over the origin of the long head of the triceps.

The symptoms are elongation of the arm, which is stiff and powerless, projecting considerably from the side, and slightly bent, both the biceps and triceps being put upon the stretch. The tension of the former muscle generally occasions pretty complete supination of the fore-arm; the axillary hollow is filled up with the head of the humerus; and under the acromion there is a remarkable depression instead of the usual convexity of the deltoid, from the absence of the bone. There is pain of the shoulder, numbness of the fingers, and more or less swelling of the whole limb.

The reduction may be effected by various methods, but the one which will generally be found the most convenient, is to make the patient sit on a chair, and then having confined the motions of the scapula by means of a folded sheet or tablecloth encircling the chest, and held at its extremities by one or two assistants, to extend the arm horizontally or slightly downward. The bandage used for pulling, which may be a shawl or skein of worsted, should be fastened a little above the elbow. To perform the coaptation, the surgeon puts his foot on the chair, and his knee in the patient's axilla, then places one hand on the acromion, and with the other seizes the fore-arm. While the extension is gradually increased, he rotates the limb outward, and

endeavors to raise the head of the bone into its place, by elevating his knee at the same time that he depresses the shoulder. When the operation is completed, a sudden snap, or more frequently a dull grating, is perceived, and all the symptoms of the dislocation disappear.

Another method which may be employed when the surgeon has no assistant, is to place his heel in the axilla of the patient, while both he and the operator lie horizontally in opposite directions; then perform extension by pulling the hand of the affected arm; and finally, effect coaptation by bending the limb inward over the fulcrum, which is afforded by the foot. This method has the advantage of being very efficient, but labors under the objection of its inconvenience and unseemliness. The reason of its efficiency is the direction of the extending force, which is not opposed to the action of the *pectoralis major* and *latissimus dorsi*, as it is when the limb is drawn outward at a right angle to the chest. In every case which proves difficult, or is expected to be so, from the duration of the displacement, extension should be made downward, or in the longitudinal direction of the body, either by pulling with the heel in the axilla, or by employing the strength of assistants, aided, if necessary, by the pulley, to draw the arm in this direction, while counter-extension is effected by a cushion secured in the axilla by a strap passing round the shoulders, and secured to a wall, or other firm support. In this way, dislocations of several weeks standing may be readily reduced; and even at the end of six or seven, success need not be despaired of; but beyond this period, notwithstanding occasional instances of success, the case in general must be regarded nearly hopeless.

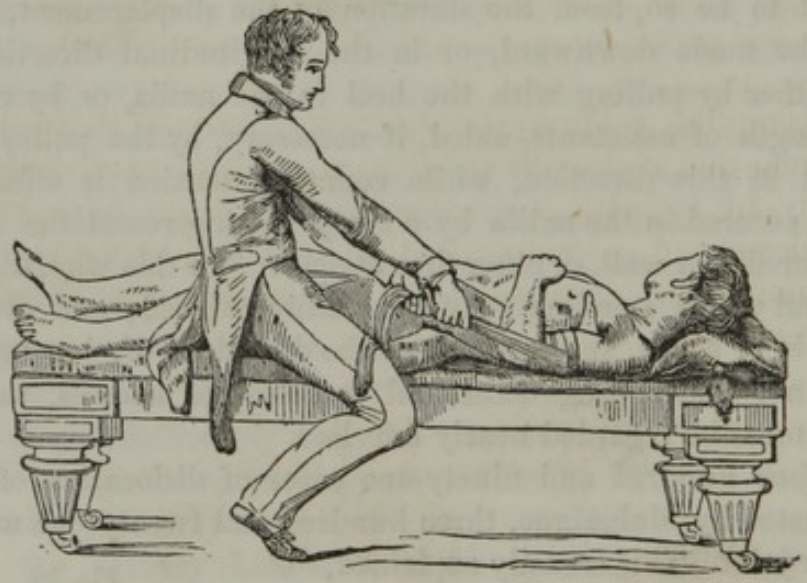
[Of four hundred and ninety-one cases of dislocation of different joints noted by Malgaigne, three hundred and twenty-one were of the shoulder-joint. This is easily explained, when we remember the numerous kinds of strains to which the joint is subjected by strains, falls, blows, etc.; beside, the socket is very shallow, and hence a force that would create no injury in most other joints, easily effects dislocation here. The frequency of the accident then induces me to introduce some plates further illustrative of the means of reducing the luxation. The character of the downward luxation may be easily understood from the accompanying plate. In this accident, the natural form of the shoulder is much altered. The muscles seem to be spread out, and the limb to be

Fig. 59.



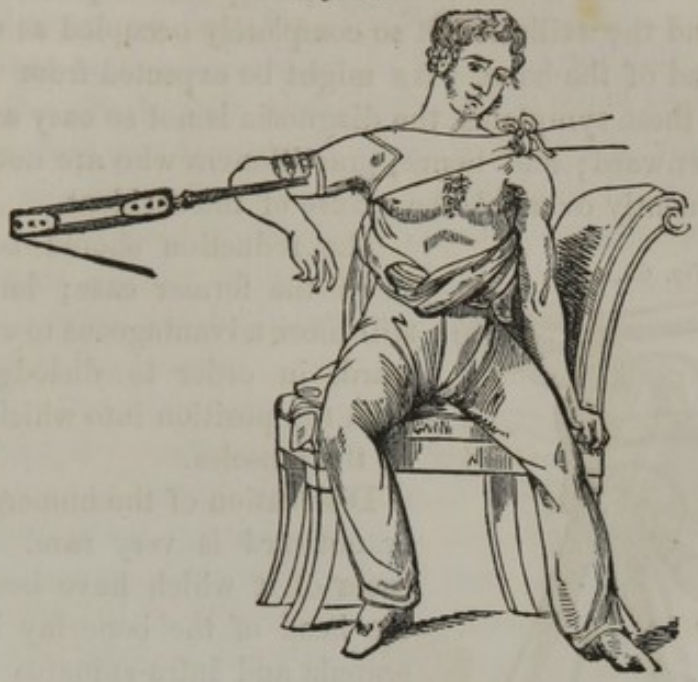
lengthened. The patient cannot drop the arm close to his side, from the fact that such an attempt brings the head of the humerus against the axillary nerves; hence, the patient will generally endeavor to hold the dislocated limb off from the body with the sound hand. By raising the arm to near a right angle, and placing the the hand in the axilla, there will be felt a hard long tumor, which the surgeon will readily recognize as the head of the humerus. The fingers are generally very much benumbed; and if the axillary plexus is long subject to the pressure of the bone, complete paralysis of the limb may ensue. To reduce this luxation, the plan mentioned by Mr. Syme, of laying by the side of the patient, with the operator's head reversed from the patient's, and using the foot as a fulcrum, may be somewhat modified, and represented by the following cut:

Fig. 60.



If, however, this force fails to reduce the luxation, the operator may then apply the pulleys, having previously arranged sufficient bandages to secure the integrity of the scapula, as illustrated in the following cut (Fig. 61). The surgeon should be careful to see that the assistants in this operation pull steady and attentively. The tension of the ropes will enable him to judge of the force which is being exerted. It is the surgeon's place to stand by the chair of the patient, hold on to his arm, and when he thinks the extension is sufficient, to place his foot on the seat, so as to bring his knee in the axilla; then by slightly pressing down on the acromion, and rotating the limb, the bone will in almost every case slip into the socket. Fig. 62 is further illustrative of this operation. If the surgeon is not called in immediately, and there is much swelling and inflammation, it will be proper to relax the muscles by lobelin.—R. S. N.]

Fig. 61.



In dislocation of the humerus forward, the head of the bone lies on the sternal side of the coracoid process; a position into which it can get only by suffering a secondary displacement after having been forced downward. The muscles then draw it upward and inward, and continuing to do this after the accident, at last elevate it as far as the clavicle allows.

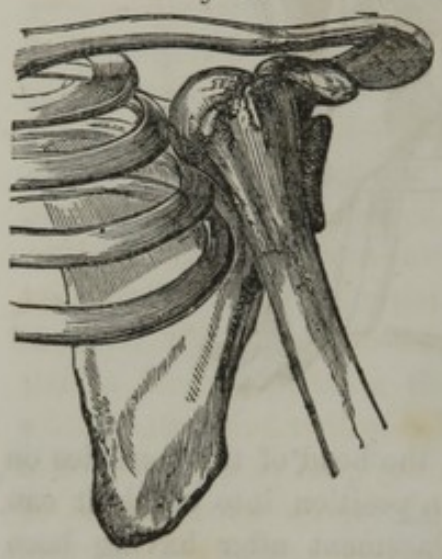
Fig. 62.



In this case the limb is rather shortened. The elbow is bent, and in the state of abduction, owing to the position of the head of the humerus, and, from the same cause, there is less numbness and swelling

of the limb. There is not so much perceptible depression under the acromion, and the axilla is not so completely occupied as when it contains the head of the bone. As might be expected from the negative character of these symptoms, the diagnosis is not so easy as that of dislocation downward; and hence, practitioners who are not sufficiently careful, frequently overlook the nature of the accident.

Fig. 63.



The reduction should be performed as in the former case; but it is here still more advantageous to extend downward, in order to dislodge the bone from the position into which it is drawn by the muscles.

Dislocation of the humerus backward or outward is very rare. In the few cases of it which have been observed, the head of the bone lay between the scapula and infra-spinatus muscles, below the spine, so as to cause a distinct external swelling in this situation, and a deficiency at the fore part of the shoulder. The arm was directed forward across the chest, and could not be moved into any other position without both force and pain. The reduction is easily effected, the extension being made in the direction which the limb retains from the accident.

Fig. 64.



In all very recent cases of dislocation of the shoulder, and more especially within an hour or two after the accident, there is considerable chance of effecting reduction by suddenly rotating the arm outward, and at the same time drawing the elbow backward, while the operator's hand in the axilla urges the head of the bone into its place. In such circumstances, therefore, this simple method ought always to be tried in the first instance—of course without any intimation to the patient of the intention to do so, which would certainly excite opposing action of his muscles.

Case I.—Euphemia Steele, aged fifty-five, was admitted on the 25th of December with dislocation of the left shoulder-joint. It appeared, that on the 5th of November, she had fallen upon her side, and in con-

sequence suffered much from pain of the left arm; that she had been under surgical treatment from the 13th to the 27th, for a bruise on the elbow; and that at the latter date, as there was nothing perceptibly wrong with the elbow, her continued complaint of pain from the shoulder downward was discredited, while a flattening, noticed under the acromion, was attributed to emaciation of the limb from want of exercise. A month having afterward elapsed without any improvement, the patient applied at the Minto House Dispensary, and being there found to labor under dislocation of the shoulder, was placed under my care in the hospital.

On the 26th, after immersion in the warm-bath for an hour, reduction was attempted by extending the arm above the elbow in a line with the trunk; but though the head of the bone, which lay forward on the inner side of the coracoid process, was made to move considerably toward the socket, it could not be fairly replaced. Two days afterward, another attempt proved more effectual. I this time, as before, laid the patient upon her back on a table, secured a hair cushion in the axilla by means of a stuffed leather belt fastened to a ring in the wall, and then extended the arm by pulleys acting upon a skein of worsted attached by the "clove-hitch" to the wrist, instead of the arm above the elbow. My reason for this alteration was, that during the former trial I had remarked the integuments of the arm and shoulder to be extremely tense, and hence concluded that the force might be more efficient if it were to act upon a more distant part of the limb. In accordance with this expectation, it was immediately perceived that the bone yielded much more readily than it had done on the previous day; and, without any snap being heard or felt, the patient soon exclaimed that her shoulder was right. On examination, it was found to be so, though the slightest movement of the arm, in the way of abduction, caused the bone to quit its place, into which, however, it could be easily returned again by slight pressure of the fingers in the axilla. A bandage, applied so as to confine the elbow close to the side, kept the joint secure until its natural connections were sufficiently restored to prevent any risk of displacement, and the patient was discharged on the 18th of January.

Case II.—William Stewart, aged fifty-six, was admitted on the 3d December, 1840, seven weeks after sustaining a dislocation of the right shoulder-joint, for which he had been treated in the country by a bone-doctor, as suffering merely from the bruise occasioned by a fall on his side. After having been an hour in the bath, he was laid horizontally, and subjected to extension by means of the pulleys, in the direction of the long axis of the body. The bone regained its place without any snap, but escaped on the extension being discontinued; and therefore,

when again reduced, was secured by a bandage confining the arm to the side.

Case III.—James Grieve, aged fifty, was admitted on the 2d day of January, four weeks after having his left shoulder-joint dislocated. He had been under the care of a surgeon, who had tried to reduce the bone, and assured him he had done so, though no relief or alteration in his feelings was afforded. He was immediately subjected to the pulleys, without success; but next day, after being an hour in the bath, had the bone restored to its place.

Case IV.—Elizabeth Gair, aged fifty-three, was admitted on the 30th day of November. She stated, that on the fourth of the same month she had fallen on her right elbow; that a surgeon to whom she immediately afterward applied, told her the shoulder-joint was dislocated, and tried to reduce it by means of his heel in the axilla; and that then (experiencing no relief, though assured the bone was replaced) she had recourse to a "*bone-setter*," who made an attempt which did not prove more successful. On the 2d of December, after being in the warm-bath, the patient was laid upon a table, with a hair cushion secured in her axilla. Extension was then made from above the elbow by pulleys, and the bone very soon returned into its socket, with a distinct snap. As abduction of the arm was found to cause renewal of the displacement, I bandaged the limb as usual to the side.

The means employed for reducing dislocation of the shoulder-joint, should be varied according to circumstances, especially the period of its duration. Within a few hours after the injury, I have repeatedly effected reduction without any assistance, by placing one hand on the acromion, and then, having bent the fore-arm to a right angle, suddenly drawing the elbow backward, so as at the same time to rotate the hand outward.

The effect of this movement is well illustrated by a case which lately fell under my notice. The patient came from the country, a distance of twelve miles, for the purpose of having a dislocation of the shoulder reduced. Seeing, from the position and powerless appearance of the arm, that the bone was displaced; and having felt, by putting my arm under his clothes, that its head lay in the axilla, I desired him to take off his coat. No sooner had this with some assistance been accomplished, than he declared that he felt his shoulder quite right, which it really was, no doubt from the action required for withdrawing his arm from the sleeve.

In ordinary cases, of a few hours to as many days' duration, the most convenient method is to seat the patient upon a chair, and pull

the arm at a right angle with the chest. If the resistance cannot be readily overcome in this way, it may be warrantable to employ the rude but powerful means of extending by the hand against the heel in the axilla. In a dislocation of two weeks' standing, which had been previously subjected, without success, to several very forcible attempts, I accomplished reduction almost instantaneously, by desiring one of my pupils to place his foot in the patient's axilla, and pull his hand. When, from the lapse of time, a still greater degree of difficulty is to be anticipated, the assistance of pulleys becomes proper, together with the use of some means to lessen the force of muscular contraction. For this purpose, tartar emetic, bleeding, and the warm-bath, are generally employed. In the earlier part of my practice, I generally combined the effects of these nauseating and depressing influences; but the one last mentioned seems to be quite sufficient of itself; and being not unpleasant to the patient, either at the time or afterward, the others had better be omitted. From the various directions in extending the arm, which have been adopted by different practitioners, it might seem as if the degree of force were of more consequence than the line of its operation; while the truth, I believe, is, that success depends very much upon the limb being held, during the extension, near the side of the body, so as to relax the pectoral and dorsal muscles, which constitute the margin of the axillary hollow. Hence the success attending the plan of pulling against the heel in the axilla; and hence the propriety of extending in a line with the trunk, when the amount of difficulty anticipated suggests the sacrifice of convenience for efficiency. The extending power may act either on the arm above the elbow, or on the wrist. The former situation allows the fore-arm to be used as a lever for causing rotation, but exposes the integuments and muscles to compression, which must always be opposed to the object in view; and, as in the case above related, may prevent it from being attained.

ELBOW-JOINT.

The elbow-joint is liable to various sorts of dislocation, the diagnosis of which is often very difficult, especially as fractures near or through the articular surfaces produce in some respects similar symptoms. There is a difference of opinion as to the comparative frequency of these accidents, and also as to the characters for distinguishing them, with the exception of one dislocation, which is certainly the most common and best marked of the whole. This is displacement of both bones of the fore-arm backward. The articulating extremity of the humerus stretches the biceps and *brachialis internus*, occasions a hard tumor at the bend of the arm, and generally causes permanent semiflection of the limb, though, sometimes, as I have had occasion to see in several instances, the arm is straight. The olec-

ranon projects behind farther than usual, and the triceps is much relaxed. The fore-arm appears shortened, and there is little or no mobility of the elbow. This accident happens from falls on the hand while the arm is bent.

Fig. 65.



The reduction is very easily performed by making extension, and then bending the fore-arm, while the surgeon, embracing the elbow with his hands so that the fingers rest on the olecranon, and the thumbs on the extremity of the humerus, pushes the displaced bones into their proper position.

Fig. 66.



The radius is liable to be dislocated separately, and may be driven either forward or backward. In the latter case the displacement is so obvious from the tumor which is caused by the head of the bone, that it can hardly be overlooked; but in the former, which is the more common of the two, the nature of the accident is very apt to escape detection until it is too late to afford relief.

[The following cuts represent both forms of the accident; the first representing the dislocation of the radius forward.

Fig. 67.



The second shows the accident backward. A little study of these cuts will be somewhat advantageous to the student.—R. S N.]

Fig. 68.



The symptoms are pain and swelling about the elbow, which is half-bent, and allows a slight degree of flexion and extension; any attempt to increase the former being attended with a sudden snap or catch, owing to the head of the radius, which lies over the coronoid process of the ulna, striking against the humerus. I have seen in one case the flexion continued quite free. The form of the fore-arm is altered, being round, instead of flat from side to side. When the hand is rotated, the radius is felt rolling under the origin of the flexor muscles, and a cavity is perceived where its head ought to be. Both forms of this accident result either from direct violence sustained on the elbow, or from falls on the hand. The reduction is very easy if performed early, and requires merely that the hand should be extended while pressure is made on the head of the bone, and the elbow is bent. The extending force is made to act on the hand, in order to concentrate it as much as possible on the radius; since, if acting on the ulna, which has not been displaced, it could not do any good. Lateral dislocations of the elbow are occasionally met with, and when examined early may in general be easily recognized by the alteration of shape and mobility which attend them. The reduction is effected chiefly by coaptation, and is not difficult, unless the parts concerned have been allowed to become rigid and adherent.

WRIST-JOINT.

The wrist often appears to be dislocated, owing to the swelling and immobility which it suffers in consequence of external injury, but these symptoms in the great majority of cases are merely the effects of sprains; and real dislocation of the joint is an extremely rare occurrence. It may take place in two directions, forward and backward, the bones of the carpus being driven upward under either the extensors or the flexors. The causes are falls on the hand. The reduction is effected by extending the hand, and pressing on the dislocated bones.

[The luxations of the wrist are more varied and important than Mr. Syme seems to think. Both bones (the radius and ulna), may be displaced backward or forward. Luxations on the back of the wrist are shown by the following cut.

Fig. 69



It is true that sprains of the wrist may be mistaken for dislocation, but a careful examination will always reveal the true nature of the accident. The dislocations of the wrist are very apt to recur before the injured soft parts have recovered; hence, compresses to retain the parts in their places had better be used a few days.—R. S. N.]

THUMB.

The first or proximal phalanx of the thumb is occasionally dislocated from its connection with the metacarpal bone, in consequence of falls or blows. It is driven upward and backward, where the extremity can be felt distinctly, while that of the metacarpal bone is not less preceptible on the palmar side.

The reduction of this apparently trivial displacement has been generally found very difficult, and sometimes altogether impracticable, the reason of which would seem to be, that the lateral ligaments of the joint remain more or less entire, and being pressed aside by the wedge-shaped extremity of the metacarpal bone in passing between them, afford a serious obstacle to its return. The best mode of proceeding is to extend the thumb with moderate force, and at the same time to exert strong pressure on the extremity of the phalanx in the proper direction for pushing it into its place. The operation when thus performed is sometimes executed with great facility. In cases where the difficulty proves insuperable, one of the lateral ligaments may be cut, which would certainly be better than leaving the bone unreduced, as has sometimes been the case. A needle sharp on the edges or a very small knife should be employed for this purpose, so as merely to puncture the skin.

FINGERS.

Both the proximal and distal, or first and third phalanges of the fingers, are occasionally dislocated backward, so that the displaced extremity rests on the dorsal surface of the corresponding bone. The accident can hardly be overlooked or mistaken, and the reduction is generally very easy, provided the force employed be directed chiefly upon the projecting end of the phalanx.

HIP-JOINT.

The hip-joint, notwithstanding the great strength of all the parts which enter into its formation, is subject to dislocation in four dif-

ferent directions. 1. Upward and backward on the dorsum of the ilium. 2. Backward into the sacro-ischiatic notch. 3. Downward into the *foramen ovale*. And 4. Forward upon the pubis.

Fig. 70.



Fig. 71.



Fig. 72.



Fig. 73.



[The foregoing four cuts illustrate the different dislocations which cannot be too well understood.—R. S. N.]

In dislocation upon the dorsum of the ilium, the limb is shortened from one and a half to two inches, the affected knee is bent over the sound one, and the foot is turned inward so that the great toe of it rests on the tarsus of the other. The thigh cannot be moved except slightly inward; the *trochanter major* is higher up, and nearer the crest of the ilium than usual, and the head of the bone can sometimes be felt rolling under the muscles when the limb is moved.

Fig. 74.



This accident happens from falls on the side, and the circumstance of having a load on the back, promotes the dislocation by increasing the strain. It happens most frequently in males, and is seldom met with either in very young or very old subjects, being in a great measure confined to those in the vigor of life.

To effect reduction the patient should be placed on a mattress upon his back. A folded sheet or tablecloth is then to be passed between the thighs, so as to support the perineum, its ends being either held in the hands of assistants standing behind the patient's head as he lies supine, or secured to a ring in the wall. A skein of worsted or any other suitable lac is next fastened round the limb immediately above the knee, and committed to assistants, either trusting to their own strength for extending sufficiently, or aided by pulleys, if the case promise to prove difficult.

Fig. 75.



The points of extension and counter-extension having been thus determined, any degree of obliquity that seems requisite may be easily given to the former by turning round the mattress a little, until it appears that the limb is extended exactly in the line which it has

assumed from the dislocation. It is usual to rotate the leg, and at the same time use means for drawing the neck of the thigh-bone outward so as to lift its head over the edge of the acetabulum; but from my own opportunities of observation, I am led to believe that any such interference is quite unnecessary, since the extension, if sufficiently powerful and properly directed, completely attains the object, as the muscles generally pull the head of the bone into its place when it has been carried far enough; but if it should seem that the margin of the acetabulum opposes any resistance to its return, the difficulty may be surmounted by drawing the upper part of the thigh outward while the knee is still held across the sound one.

Fig. 76.

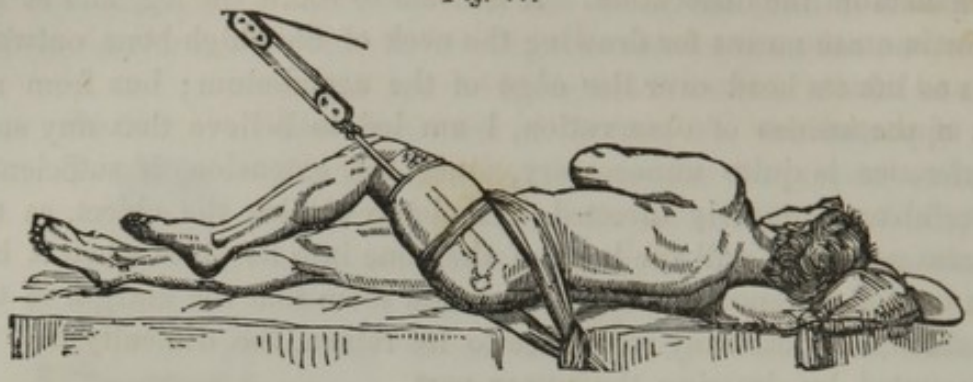


The dislocation into the ischiatic notch is produced much in the same way as that on the dorsal surface of the ilium, but does not happen so frequently. The symptoms also are similar, and differ only in being less marked. There is less shortening—less bending of the affected limb over the sound one—less inversion of the toes—and less displacement of the *trochanter major*. In obscure cases a good diagnostic will be afforded by trying to bring the thigh into a straight line with the trunk of the body, which is impossible while the bone is thus displaced. The patient, when lying upon his back, finds it necessary either to arch the loins so that the surgeon may press his hand between them and the bed, or to keep the thigh bent upward in in the pelvis. If the back is straightened the thigh ascends, and if the thigh is laid flat the back becomes arched. The reduction is accomplished in the same way that has just been described, though it has been said to require more force to lift the head of the bone out of its preternatural situation.

[It will be perceived by Fig. 77, that there is some modification in the mode of reducing the luxation from that of reducing the dislocation upon the dorsum of the ilium. In this case the patient is placed on his side, and a towel tied around the upper part of the thigh, by which the head of the bone may be lifted at the proper moment out of the notch.—R. S. N.]

The dislocation downward is caused by heavy bodies falling on the hip, while the limb is in a state of abduction. The symptoms are

Fig. 77.



extremely characteristic, there being elongation to the extent of an inch and a half—abduction, owing to the stretching which is suffered by the gluteal muscles—and flexion of the thigh on the pelvis, from the same cause affecting the *iliacus internus* and *psoas magnus*. These symptoms are often stimulated to a very perplexing extent by the involuntary obliquity of position which the pelvis acquires from

Fig. 78.



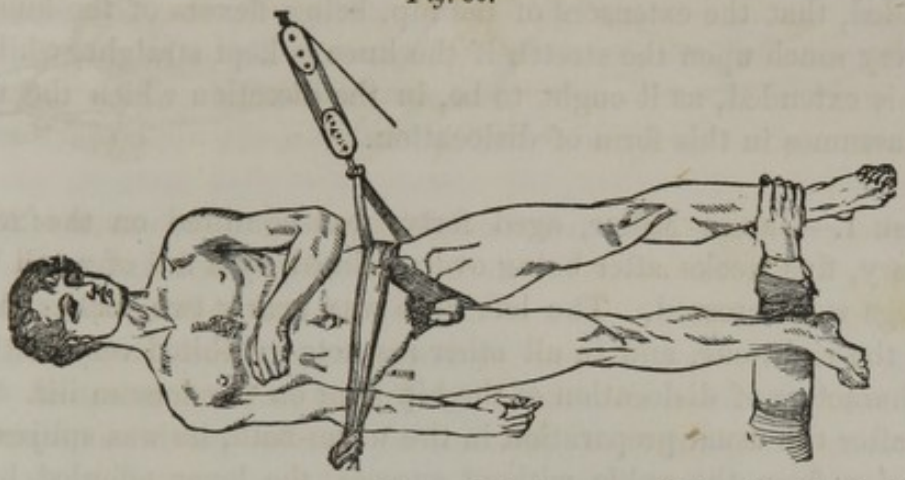
Fig. 79.



irritation of the hip-joint, occasioned by blows or other kinds of external violence; and inexperienced practitioners are consequently apt to commit the mistake of treating with rough measures a case that requires those of the most soothing sort. The best guide in avoiding this too common error is afforded by the *trochanter major*, which, when dislocation really exists, will be found by measurement to be

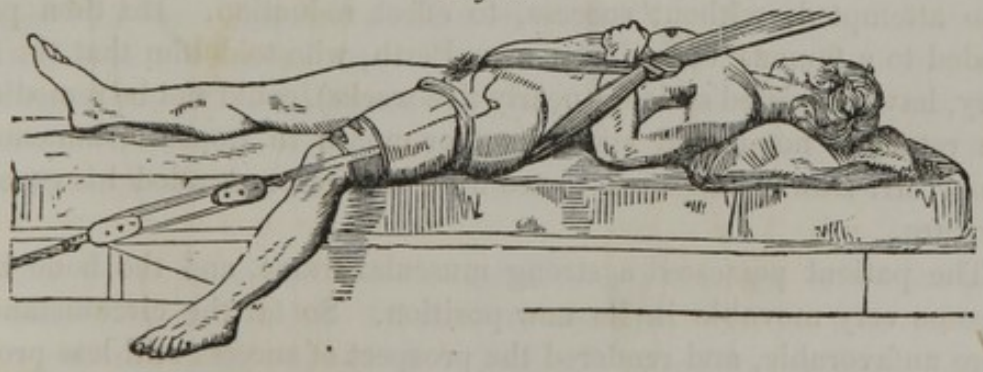
more distant from the anterior spinous process of the ilium than its fellow is on the other side. The reduction is accomplished by extending and counter-extending the thigh and pelvis transversely, while the foot of the affected limb is carried inward under the sound one.

Fig. 80.



The dislocation forward on the pubis is caused by the body being suddenly bent backward, while the foot is fixed and the limb is kept straight by the strong involuntary action of its extensor muscles. The symptoms are slight shortening, eversion of the toes, and the head of the bone being felt distinctly rolling under the integuments of the groin. The reduction is performed by extending downward and backward, while the patient lies on his sound side, and then drawing the upper part of the thigh outward, so as to lift the head of the femur over the acetabulum.

Fig. 81.



It is only in cases of dislocated thigh-bone that the pulley is ever necessary or even useful, and even here it may in general be dispensed with, unless the patient is extremely robust, or the dislocation has remained long unreduced. It has often been a question at how great a length of time after dislocation may reduction be effected. I have succeeded at the end of seven and nine weeks; but, in using force at a more distant period, should have little hope of success, and some fear of doing harm, by deranging the process by which the displaced bone becomes accommodated to its new position.

In dislocation of the hip-joint, the extending force may act either upon the ankle, or above the knee; but as rotation of the limb very considerably conduces to replacement, and as this movement is best effected by means of the leg used for a lever while the knee is bent, the preference should be given to extension from above the knee. It may be added, that the extensors of the hip, being flexors of the knee, are put very much upon the stretch if the knee is kept straight, while the limb is extended, as it ought to be, in the direction which the thigh-bone assumes in this form of dislocation.

Case I.—James Millar, aged forty, was admitted on the 23d of January, five weeks after being overwhelmed by a fall of earth while his legs were crossed. The left limb was nearly two inches shorter than the right one, and in all other respects exhibited very distinctly the characters of dislocation of the hip-joint on the dorsum ilii. Next day, after the usual preparation in the warm-bath, he was subjected to extension from the ankle without success, the lever afforded by the foot for causing rotation being obviously very inefficient, and the muscles on the back part of the thigh feeling extremely tense. The pulleys were then made to act above the knee, and speedily restored the bone to its place.

Case II.—William Scott, aged thirty-six, a mason in Dunfermline, fell while walking on the road, from his foot becoming fixed in a cart-track, and dislocated his left thigh-bone upward. He applied to a bone-setter in the neighborhood, and also to a regular practitioner, who attempted, without success, to effect reduction. He then proceeded to a famous bone-doctor near Perth, who told him that the injury, having existed so long (nearly five weeks), could not be remedied. He returned home, and spent another month in hopeless lameness, when Mr. Dewar happened to see him, and recommended his case to my care.

The patient possessed a strong muscular frame, and the bone had become very movable in its new position. So far the circumstances were unfavorable, and rendered the prospect of success still less promising than it appeared to be, from nearly nine weeks having elapsed since the accident happened. It being still considered right to make an attempt, the day after his admission, on the 6th of December, the patient, after losing sixteen ounces of blood from the arm, was put into the warm-bath for an hour. He was then carried into the theater, and took at intervals a solution containing four grains of tartrate of antimony. He lay upon his right side, with a mattress between him and the floor. A hair cushion was placed in the perineum, over which and obliquely round the pelvis a broad can-

vas band was passed, and fastened to a ring in the wall. A skein of worsted being then secured to the thigh immediately above the knee by the *clove-hitch*, extension was effected by the aid of pulleys nearly in the direction which the limb had acquired through the displacement of the bone. At the end of forty minutes, reduction was effected without any snap or perceptible grating.

The patient, who had not vomited in the theater, did so frequently after going to bed. He was kept very quiet, and had the hip occasionally fomented. He recovered quickly and completely, so as not to suffer the slightest pain or lameness. He paid a visit to the hospital after his dismissal, and stated that he had that day walked fifteen miles without any difficulty.

Case III.—James Inglis, aged fifty-six, while working under ground in a coal mine, and stooping forward, was struck down by a fall of earth upon his back. He was sent in from the neighborhood of Dalkeith, where the accident happened, on the 10th of December, the day after receiving the injury. Having repeatedly effected reduction in recent cases of dislocated hip, by the simple means of unaided manual extension, I did not think it necessary to subject this patient to any preparatory process, and at once applied the pulleys, during the operation of which he was made to take repeated doses of a strong solution of tartrate of antimony. At the end of three-quarters of an hour, finding that the bone still remained displaced, I resolved to desist for the time, and make another attempt after a more careful preparation.

Next day the patient was in a very feeble state, having been extremely sick ever since returning to bed from the operating theater. He was nevertheless put into the warm-bath for an hour, and bled from the arm to the extent of twelve ounces. The process of reduction was then resumed, and in a very short time proved successful.

Case IV.—Elizabeth Waters, aged twenty-six, fell down a coal-pit, near Kirkcaldy, to the depth of twenty feet, and, in consequence, dislocated her right thigh-bone. Different practitioners assured her that the joint was merely bruised, and would recover through time. At length she applied to a gentleman supposed to be peculiarly skillful in such cases, who informed her that the bone was out of its place, and could not be returned to it, on account of the long time (five weeks) that had been allowed to elapse. In the course of another week, she was sent to Edinburgh, and entered the hospital on the 17th of July.

She was admitted at eleven, A. M., and immediately placed in the warm-bath, where I found her on making my visit at twelve. As her

muscular system did not seem strong, or likely to afford much resistance, I proceeded to attempt reduction without any further preparation, except administering a dose of tartrate of antimony. The process was conducted as has been described above, and at the end of ten minutes proved successful, the bone returning into its place with a dull grating sensation. The patient suffered some pain about the joint, and was kept very quiet for a fortnight. She left the hospital on the 3d of August, with the prospect of being soon quite well.

These cases show the importance of preparatory measures for reduction, especially the warm-bath; and I may add, that in all of them the extension was not maintained continuously, but completely relaxed from time to time, in order to fatigue the muscles, and disturb the patient's involuntary efforts to resist the exertions for his relief.

Case V.—James Hunter, aged eighteen, was admitted on the 13th of February last, suffering from the effects of an injury caused the preceding day by a railway carriage, which threw him down with great violence. In addition to some superficial bruises, the right thigh-bone was dislocated upward and backward. The process of reduction was conducted as usual, and apparently with success, as the bone distinctly moved, and grated under my hand, which rested upon the trochanter, the characteristic deformity at the same time disappearing. The injured limb, instead of being almost two inches shorter, and turned inward, so that the toes rested upon the instep of the other foot, seemed hardly at all diminished in length, and had become quite straight in its direction. But the limb, though nearly, was not quite of the proper length; the foot, though no longer inverted, did not admit of rotation outward; the thigh had a stiff constrained aspect; and the patient's back, instead of resting flat upon the mattress, remained in an arched form, unless the thigh was raised into a position of semi-flexion on the pelvis. These characters denoted dislocation of the thigh-bone into the ishiatic notch, and led to a repetition of the process for reduction, which very soon had the desired effect, and the appearance of the limb became, in every respect, natural.

The important feature of this case is the secondary dislocation that took place during the reduction. In more than one instance which has fallen under my observation, the same change of circumstances occasioned the serious error of supposing that the bone had returned to its proper place, while it had merely shifted into the notch; and as that excellent authority, Sir A. Cooper, though he has warned against the risk of this occurrence in reducing dislocation into the foramen ovale, has not noticed it with regard to the more common case of dislocation on the ilium, or pointed out the deceitful alteration of appearances so induced, I hope the instance here related will not be without use.

KNEE JOINT.

The patella may be dislocated laterally by direct violence, and this accident is most apt to happen when the parts concerned are in the relaxed state, which results from sudden removal of a dropsical effusion into the joint. The dislocation is very readily recognized, and admits of easy remedy, by bending the thigh upon the pelvis while the knee is straight so as to relax the extensor muscles completely, and then pressing the patella into its proper place.

Fig. 82.



[The patella may be dislocated outward, inward, or upward. The outward dislocation is by far the most common. The character of this luxation is readily seen by this plate. In reducing it, the patient should be placed in a recumbent position, the limb lifted by the heel, when the edge of the patella most distant should be pressed down. This elevates the ridge on the posterior surface allowing it to pass over the condyle, when the vasti and rectus muscles readily draw it in the proper position. In luxation upward, there is no difficulty in replacing the patella, but a roller must be applied to the joint to prevent a recurrence.—R. S. N.]

The tibia and fibula are so strongly connected with the femur, that they very seldom suffer dislocation. In consequence of a violent wrench to one side, there is sometimes a laceration of one or other of

Fig. 83.



Fig. 84.



the lateral ligaments, and a partial displacement of the articulating surfaces of the tibia. In the rare cases of its complete dislocation, it has generally been found behind the femur; but according to Sir A.

Cooper, it may also be driven forward. The accident is very readily recognized, owing to the great size of the articulating surfaces, and the thinness of their surrounding parts. The reduction, which is not difficult, requires extension and counter-extension, accompanied with pressure on the dislocated bone.

[The tibia may be separated from the femur at the knee in four ways: forward, backward, and to either side. The two preceding cuts respresent the two lateral displacements. These displacements are only partial, as the ends of the bones do not shoot over and pass each other. Extension and slight rotation is usually sufficient to reduce these lateral luxations.

The two following figures illustrate the forward and backward luxations. The nature of the displacements can hardly be mistaken.

Fig. 85.



Fig. 86.



Their reduction, like the others, is easily effected by simple extension and slight pressure in the opposite projecting joints.—R. S. N.]

It is thought that the semilunar cartilages are subject to displacement, since persons of relaxed frame sometimes complain of pain and stiffness in moving the knee, which are felt suddenly, and disappear no less so when the joint is forcibly bent and extended.

ANKLE-JOINT.

Though the ankle is frequently dislocated as a consequence of fracture through either malleolus, as has been noticed under the proper head, yet dislocation happens so rarely by itself, that it is hardly necessary to mention the possibility of its occurrence. This dislocation can be only backward or forward, and is reduced chiefly by coaptation.

[Very much confusion has arisen here; some surgeons calling the

Fig. 87.



Fig. 88.



displacement dislocation of the ankle, and others of the foot. The descriptions are, therefore, often entirely opposite. I shall call the accident dislocation of the foot, and name *four* varieties, instead of *two*, as done by Mr. Syme. There are two lateral, a backward, and a forward luxation, which may occur. The outward luxation is rarest, and the inward displacement most common. These lateral luxations are easily reduced by extension, after which splints and bandages must be applied to secure them. In the dislocation backward, the deltoid ligament is ruptured, while the fibula is broken, and the tibia is thrown forward on the cuneiform bones, shortening the foot and lengthening the heel.

Fig. 89.



The dislocation forward is very rare, and is not described by many authors. In this case the tibia is thrown upon the upper and posterior surface of the os calcis, behind the astragalus. These last two luxations are generally compound, and must be treated not unlike fractures after having been reduced.—R. S. N.]

ASTRAGALUS.

When a person falls from a height on his heel, the violence thus sustained not being diffused over a number of articulations, as when he alights on his toes, is transmitted to the astragalus with such intensity as sometimes to eject it from its place, turn it upside down, and make it protrude under the integuments of the instep, or force its way through them. This dislocation does not admit of reduction, and the bone, when so displaced, must be removed. If an opening has not been caused by the accident in the first instance, one ought to be made without delay, in order to anticipate and prevent the violent inflammation that will otherwise occur, as the precursor of ulceration or sloughing, by which the loose astragalus must make its escape.

LOWER-JAW.

The lower-jaw cannot be dislocated so long as it is closed, since the condyles are then firmly secured in the glenoid cavities. But when opened so as to bring them forward on the anterior convex part of the articular surfaces, it may be readily displaced by a lateral impulse, or even by excessive action of the muscles. One or both of the condyles then glide forward over the root of the zygomatic process; and sinking into the hollow on the opposite side, retain the jaw fixed and opened in a painful, unseemly, but characteristic position.

The reduction of this dislocation is extremely easy, since, if a fulcrum be placed at the back part of the grinding surface, the anterior

Fig. 90.



Fig. 91.



portion of the jaw affords a powerful lever for replacing the deranged condyle or condyles. The best fulcrum for this purpose consists of one

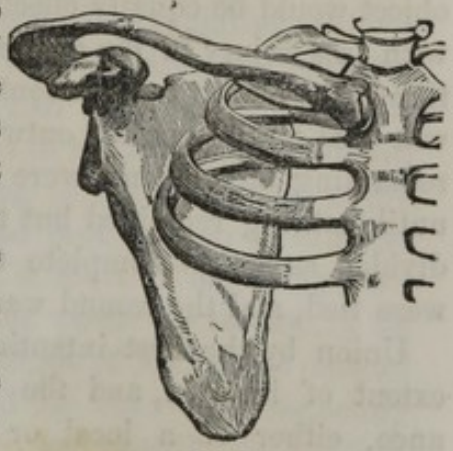
or both thumbs, accordingly as the dislocation is single or double, protected from the action of the teeth by being wrapped in the corners of a handkerchief or towel. After the reduction, the patient ought for some time to avoid opening his mouth wide, and exposing his jaw to the circumstances which favor a recurrence of the accident, as a considerable predisposition to it remains.

[Luxations of the jaws, though not serious, are very inconvenient, and, for the time, give a very ridiculous appearance (Fig. 90) to the patient. The nature of the accident is made very apparent by Fig. 91. The reduction has been already sufficiently indicated by Mr. Syme.—R. S. N.]

CLAVICLE.

The sternal extremity of the clavicle is sometimes dislocated forward, in consequence of falls on the shoulder and arm. The displacement is readily recognized by the swelling arising from the projecting end of the bone and superjacent portion of the sterno-mastoid muscle, and by the mobility of the clavicle and depression of the shoulder that proceed from it. The dislocation is readily reduced by elevating the shoulder, and pressing down the sternal extremity of the clavicle, but returns so soon as the restraint, which produces these effects, is removed. A bandage, therefore, sufficient to retain the bone permanently in its proper position, should be applied; and the apparatus best calculated for doing this, consists of a sling to support the arm, together with a compress placed on the end of the clavicle, and secured by means of a figure of 8 bandage.

Fig. 92.



The acromial extremity of the clavicle is also occasionally dislocated; but this accident requires no particular consideration, as its causes, symptoms, and treatment are the same as those of fracture of the acromion, or acromial extremity of the clavicle.

[The following case is so much to the point that I think it should be inserted at this place. The case occurs in Syme's Pathology and Practice.—R. S. N.]

In the beginning of May last, I was asked by Dr. Combe to see a gentleman in Leith, between thirty and forty years of age, who had for about two years suffered from a tumor of the clavicle. It was of an oval form, as if resulting from a general expansion of the bone, and extended from the sternal articulation to within a short distance of the

acromion, possessed a very firm consistence, and was occasionally the seat of painful sensations. During the period of its existence, the patient had had occasion to travel round the world, and in his progress obtained many different opinions respecting the disease, with no less various advice as to its treatment. At the advanced stage when it came under my observation, the case seemed free from any obscurity either as to its nature or the course requisite for its remedy. There was obviously a morbid growth affecting the bone throughout its whole thickness, and admitting of removal only by excision of the clavicle.

On the 13th, I performed the operation in the presence of Dr. Combe, with the assistance of Drs. Duncan and Mackenzie. The patient being seated on a chair, an incision was made along the whole extent of the bone, and a second at its sternal extremity, extending upward and downward at right angles to it.

Having reflected the flaps, I divided the muscular attachments, and ascertained the precise limit of the disease toward the acromion, which it so nearly reached, that the easiest way of proceeding would have been to separate the bones at their junction. But thinking that the object would be equally effectually attained by division of the clavicle, with less injury to the connections of the shoulder, I sawed the bone through, so as to leave about an inch of its extremity. The clavicle was next forcibly pulled outward by means of strong forceps, while its remaining attachments were carefully separated toward the sternum, until nothing remained but the ligaments of the joint, which I then divided so as to complete the disarticulation. Three small vessels were tied, and the wound was dressed as usual.

Union by the first intention took place through nearly the whole extent of incision, and the patient recovered with so little disturbance, either of a local or general kind, that he was able to leave his bed-room before the end of a week. Complete cicatrization was delayed at the acromial extremity of the wound, by the separation of small particles from the bone, apparently in consequence of the injury it had received from the saw. But this did not prevent the patient, in the course of a few weeks, from proceeding to Wales, where he intended to reside, and whence he writes that the wound is quite healed, and the arm getting strong and useful. As I fully expected that the absence of the clavicle would have occasioned considerable deformity and want of power, it was an agreeable surprise to see, that hardly any observable alteration in appearance resulted from the operation.

I am not aware that disarticulation of the clavicle from the sternum has hitherto been practiced in this country, and therefore think it right to place the case just related upon record. The only part of the opera-

tion in the slightest degree difficult or embarrassing, was in separating the large articular surface of the bone from its connections, where the vicinity of the pleura and venous trunk rendered extreme caution requisite.

VERTEBRÆ.

The vertebræ are very seldom dislocated without fracture or morbid alteration of the bones; and in all cases the accident is of importance chiefly in respect to the organs contained within the vertebral column, along with which, therefore, it may be more properly considered.

WOUNDS OF THE JOINTS AND COMPOUND DISLOCATIONS.

The synovial membrane is very prone to acute inflammation, which causes violent constitutional disturbance, and leads to the most destructive morbid alterations. Wounds of the joints, therefore, must always be regarded as serious injuries; and the more so in proportion to the size of the joint, and degree of irritation which accompanies the wound.

The great object in treating such wounds should be to make them heal if possible by the first intention, which, of course, prevents the necessity of inflammation as the precursor of granulating action. With this view, all sources of irritation, whether direct or indirect, that may seem to exist, ought to be removed. If there is displacement of the articulating surfaces, they ought to be accurately reduced, which is generally effected with ease, owing to the laceration of the surrounding parts; and if the head of a bone protrudes so as to resist moderate force employed for this purpose, it must be cut away with the saw or pliers, since the distension that would be caused by its pressure would excite inflammation. The edges of the wound should be placed in contact, and assiduously cooled by wet cloths frequently changed, while motion of the limb is carefully prevented by the application of splints. The constitutional treatment is to be conducted on the same principles. The patient will generally be benefited by bleeding and purging, to lessen his strength of action; but sometimes the opposite means are required to correct the irritability that proceeds from weakness.

[It seems strange, that Mr. Syme should not have detected the inconsistency of the practice here recommended. He admits that weakness is accompanied by irritability, and yet, after telling us to avoid reducing or increasing it, he says, "the patient will generally be benefited by bleeding and purging," both of which are well known to increase the irritability and impressibility of the system. Plenty of quinine internally, and fomentations of gelseminum, or lobelia to the joint, will be found the best means of preventing severe inflammation. If inflammation come on, it is caused by some irritating substance, as

the acid synovial fluid, which must be admitted to freely escape.—R. S. N.]

The diet in general should be strictly antiphlogistic; but here also exceptions may require to be made, on account of the peculiar circumstances of the case.

When compound dislocations are treated on these principles, the necessity for amputation, which used formerly to be generally performed as their only remedy, is greatly lessened. The ankle-joint is most subject to the accident, and the formidable appearances which are presented by it, seem at first sight to warrant the removal of the limb; but when the projecting extremities of the bones are sawn off, the distortion rectified by suitable splints or bandages, and the edges of the wound placed fairly together, the cure is often accomplished very readily. The elbow or wrist-joints may, in general, be preserved by the same means; but the knee-joint, when subjected to the great irritation which attends both a dislocation and penetrating wound, can hardly be expected not to inflame, and either prove speedily fatal, or require subsequent amputation; hence, in such an injury, the limb will generally require to be amputated immediately. Gun-shot wounds of the shoulder and elbow, unless the integuments, bloodvessels, or nerves are much injured, may be remedied by cutting out the articulation, as in cases of caries.

INFLAMMATION OF JOINTS.

Inflammation of the joints is attended with deep-seated pain, greatly aggravated by motion or pressure, swelling, redness, and tenderness of the integuments, and more or less constitutional disturbance, according to the intensity of the local symptoms. It is caused by the direct irritation of wounds, strains, and bruises; and indirectly by exposure to cold, errors of diet, or exercise, and whatever induces derangement of the system. The consequences of inflammation in this situation are numerous and important, as might be expected from the number and nature of the textures which enter into the constitution of the articular apparatus. The synovial membrane becomes the seat of dropsical and purulent effusions, adhesions, thickening, and gelatinous degeneration; the cartilage suffers ulceration and exfoliation; and the bones are liable to suppuration, caries, and anchylosis, or union of their adjoining surfaces. The consequences of inflammation are serious in proportion to the severity of the attack, and the unsoundness of the patient's constitution; but it ought always to be dreaded, and induced, if possible, to terminate in resolution.

When the symptoms are acute, blood should be freely abstracted locally by leeches or cupping; and if there is much strength of action in the system, general bleeding must also be practiced. Calomel and

opium are very useful where there is much irritability; and the tartrate of antimony, given in frequently repeated doses, is on all occasions a most valuable remedy; not only by allaying violent action, but also by promoting the secretions of the skin and mucous membranes. When the inflammation is subacute, warm fomentations, anodyne liniments, such as the tincture of soap and opium, with the internal use of diaphoretic medicines, as Dover's powder, calomel, and opium, or *vinum colchici*, afford most relief. In its chronic state, counter-irritation effected by stimulating liniments, blisters, tartrate of antimony, setons, and issues, especially those made by the actual cautery, with perfect rest, and a moderate degree of pressure, are the means which deserve most confidence.

[I must be permitted to think, that American surgeons have made great advances on this practice, which, to say the least, is as old as medicine itself. It does not indicate a single step forward, but rather to show less philosophy than was exhibited by the earliest practitioners. Calomel, opium (except in very large doses), and tartrate of antimony, are all powerful irritants; and why they should be used when the most soothing agents are demanded, I cannot perceive. The vapor-bath, gelsemin, fomentations, perfect rest, and a light diet, are all that is requisite here. Calomel, opium, bleeding, and especially the antimony, are to be avoided.—R. S. N.]

In preventing motion, and effecting the compression deemed requisite, the best means certainly consist in the application of leather splints. Pieces of bend-leather, cut to the proper size, having been moistened, and placed on each side of the joint, are closely moulded to its form by the pressure of a common roller. When dry and rigid, they are taken off, and lined with some thinner and softer leather; after which they are again bandaged on, and employed so long as may be necessary. In cases where the knee is severely affected, it is very important to prevent motion of the ankle-joint also, and for this purpose I find nothing so useful as a splint of iron wire covered with chamois leather.

DROPSY OF THE JOINTS.

The synovial membranes of the joints, though all similar to each other, and resembling, in structure as well as function, the serous coverings of the soft parts, are not equally subject to dropsical effusion. It is extremely common in that of the knee, but very rare in all the others.

Dropsy of the knee-joint is occasioned by a great variety of circumstances. It occurs most frequently in persons of weak and irritable constitutions, who often suffer from it in consequence of very slight direct irritations, such as twists and bruises, or the indirect operation of exposure to cold. It is met with, however, occasionally in the

strongest frames; but then the irritation is always direct and severe; such as fracture of the patella or femur, especially in its lower third, or a violent strain. The effusion generally appears almost immediately after the injury is received, and is at first attended with more or less acute symptoms of inflammation. It is readily recognized by the swelling and fluctuation which are caused by its presence. The enlargement reaches as far up the thigh as the synovial membrane extends; it fluctuates when subjected to pressure; and the patella is felt to float, as it were, so that it may be made to strike upon the condyles of the femur if pushed downward with moderate force.

The means employed for treating this affection must vary with the acuteness of the inflammatory symptoms which attend it. In the first instance, it is often necessary to cup or leech and foment the joint, while constitutional remedies of a co-operative kind are at the same time administered. When the swelling ceases to be painful, but continues still more or less red, tender to pressure, and unable to bear motion, a cooling discutient lotion may be used with advantage. Finally, when there is no longer any indication of excited action, and the only inconvenience that remains is merely that occasioned by the presence of the fluid, the joint should be blistered once or oftener, according to the extent and duration of the disease, and then carefully bandaged. In cases of a rheumatic kind, blisters may be employed at an earlier stage with advantage. For some time after the cure is completed, the patient should wear a laced knee-cap, to protect the joint from the various external injuries to which it would be exposed in consequence of its weakened state.

[I am in the habit of treating dropsy of the joints on different principles, and my results, if not superior, are at least very satisfactory. It is always necessary to put the patient on an alterative course of treatment; for this purpose I employ the compound syrup of stillingia, give a light and nutritious diet, apply bitter herb fomentations to the dropsical joint for a few days, enjoin rest of the limb; then displace the bitter herb fomentations with the irritating plaster. If its action is too slow, the joint may be occasionally moistened with some stimulating liniment; in very obstinate cases a roller may be applied to the limb from the extremity to the diseased joint. In the meantime the skin should be kept in the best possible condition by the proper use of diaphoretics, the alkaline sponge-bath, never neglecting the use of the coarse towel friction, often sponging the surface. If this plan be persevered in, nearly all cases of dropsical joints will yield.—R. S. N.]

MOVABLE CARTILAGES IN JOINTS.

Small movable bodies are occasionally met with in the cavities of the joints, either quite detached or connected with the parietes of the

articulation by a narrow neck. They have a glistening pearly luster, and when divided are found to consist of a gristly substance inclosed in a firm capsule, with a bony nucleus in the center. They are of various magnitudes, from the size of a barleycorn to that of a pigeon's egg, and are also very different in their shape, which is generally round, oval, or lenticular, but sometimes tuberous. They exist either singly or in numbers together, but seldom exceed two or three. They have been discovered in many of the joints, but are by far most common in the knee. Even here, however, they may be considered a rare occurrence. They generally make their first appearance in adults.

The origin of such bodies has been ascribed to the effusion and organization of blood and lymph—to the detachment by fracture of a portion of the articular surface—and to the separation of morbid growths from the margin of the cartilages of the joints. The last of these explanations is on the whole the most probable, as the bodies in question are often observed by the patient to be fixed before they become movable, and they have been repeatedly found on dissection adhering to the extremities of the bones. It may also be observed, that, so far as can be learned by external examination, they do not suffer any change of shape or size after they are first discovered.

These bodies occasion no inconvenience, except when they happen to be squeezed between the opposite articular surfaces; they then excite a sudden and severe sickening pain, which forces the patient instantly to desist from the exertion in which he was engaged, and frequently makes him fall at once to the ground. In consequence of this irritation repeated from time to time, the joint becomes the seat of a dropsical effusion, which is sometimes the first symptom of the disease that attracts the patient's attention, as he is apt to account for the pain previously suffered by referring it to rheumatism. Unless proper means are now employed, the use of the limb may be almost completely lost.

The radical cure is easily effected by cutting into the joint, and extracting the cause of irritation. But this very simple operation is attended with considerable risk of exciting such a degree of inflammation, as to endanger not only the patient's limb, but also his life. In order to diminish the danger, as far as possible, the patient should be confined to bed, and restricted to a regulated diet for some days previous to the operation. The cartilage should then be moved into that part of the joint which is most superficial, as over the flat surface of the external condyle in the case of the knee, and held steadily there, while a free decided incision is made down upon it, so as to allow of its escape when urged out by the same pressure that was employed previously to fix it, and render unnecessary any groping with hooks, forceps, etc., which must increase the chance of inflammation. The

edges of the wound ought to be placed together, and kept constantly cool with wet cloths; the joint being at the same time protected carefully from motion, and all other kinds of irritation. It lately occurred to me that the object of this operation might be attained more safely by merely dislodging the movable body from the joint by puncturing the skin with a needle or narrow-bladed knife, and opening the synovial membrane by a subcutaneous incision, through which the body could be pushed into the cellular substance. I tried this method in one case with a satisfactory result. The patient was a man about forty, of a very irritable constitution, admitted into the Infirmary on account of a cartilage in the knee, which completely disabled him for any sort of active employment. Superficial suppuration took place a few days after the dislodgement; and it being necessary to make an opening for the discharge of matter, I took the opportunity of extracting the cartilage. The joint remained free from disturbance. The best way of proceeding would probably be not to wait for suppuration, but to divide the skin so soon as the wound in the synovial membrane has had time to heal.

Mr. Hey, of Leeds, as a substitute for excision, which, though performed with every precaution, must always be considered a hazardous proceeding, suggested the application of pressure to the joint, so as to prevent the cartilaginous body from moving about as usual. He has recorded several cases in which this practice proved completely successful, the movable substances, though they still remain perceptible, ceasing to occasion any inconvenience. The dropsical effusion which attends the disease opposes or altogether prevents effectual compression with this view, and therefore leeching, discutient lotions, or blisters, according to the circumstances of the case, must in the first instance be employed to promote absorption, after which a bandage or laced cap surrounding the joint ought to be constantly worn. The operation ought not to be resorted to unless this palliative treatment has been tried without success, and the disease is productive of serious inconvenience to the patient.

Robert Pitcaithly, aged thirty-seven, was admitted into the Surgical Clinical Ward of the Royal Infirmary, on the 26th of January, with the view of being relieved from a movable body in the knee-joint, which had occasioned him much distress; and repeatedly, during the course of the last two years, prevented him from following his employment as a cabinet-maker. It had been at one time on the outer side of the knee, but latterly lay always either behind the joint or just at the anterior edge of the *gracilis* and *sartorius* tendons. In his lecture upon this case, Mr. Syme explained the danger of removing such bodies by incision, not from the entrance of air, as had been erroneously alleged by many, and more recently been maintained by M.

Guerin; but from the risk of the wound not healing by the first intention, in which case inflammation necessarily occurred, and extended to the articular textures. It was also remarked, that the patient's aspect, habit of body, and hasty manner, all led to the conclusion, that he was not a good subject for this or any other operation, so that it seemed peculiarly objectionable in his instance. On the other hand it was stated, that the palliative mode of treatment, by applying blisters to promote absorption of the dropsical effusion usually attendant upon the presence of a loose cartilage, and then bandaging to restrain its movements, had been found very ineffectual; and it was suggested that the confidence in this practice, entertained by some practitioners, might perhaps proceed from confounding partial thickenings of the synovial membrane with the presence of a loose body in the joint, an error of diagnosis frequently committed, and of which an example was mentioned in the case of a patient whose complaint had been demonstrated in the Clinical Ward to depend upon the former cause, but who nevertheless had afterward been subjected, by another surgeon, to an operation for the removal of a cartilage, which accordingly was found not to exist.

In these circumstances, Mr. Syme stated that it had occurred to him to attain the object by subcutaneous incision; that is to say, puncturing the skin merely, and opening the synovial membrane freely, so as to let the cartilage escape, and then pushing it into the cellular substance, where it might become adherent, suffer absorption, or occasion an abscess under the skin. The operation was performed on the 1st of February by means of a narrow curved bistoury, introduced very obliquely. The cartilage was dislodged without any difficulty, and conveyed about an inch toward the patella. A compress of lint and a bandage were then applied. The patient made no complaint until the second night after the operation, when he had a slight rigor; and some swelling, with redness appeared over the seat of the cartilage. On the 5th the inflammation had increased, and red lines extended along the skin of the thigh to the groin, where the glands were felt enlarged. During the two succeeding days the local appearances became less indicative of disturbance; but on the 8th, fluctuation being distinctly perceived over the cartilage, a free incision was made, which allowed a considerable quantity of matter to escape. On the 11th, as the discharge continued copious, the cartilage was extracted by means of a sharp hook. It was of an oval flattened form, upward of an inch in length. The flow of matter is still rather copious, but appears to proceed entirely from the subcutaneous cellular substance, as in the common housemaid's inflammation of the knee. The joint has never been in the slightest degree swelled, red, or tender; and the patient seems in a fair way of recovery.

This case has been reprinted as it appeared originally, in consequence of a similar proposal having, about the same time, emanated from a French provincial surgeon, M. Goyrand of Aix.

Mr. Liston has attempted to improve the operation, by making a double puncture and complex incision of the synovial membrane, in cases where unusual difficulty is experienced in displacing the cartilaginous body from the joint.* But I should fear that there would thus accrue an increase of excitement to inflammation, the avoidance of which is the great object of my suggestion. In a case that was treated in the hospital last winter, finding it impossible to effect dislodgment of the cartilage on account of its peculiar form, I applied a bandage, and enjoined perfect rest, with the effect of obtaining complete relief; so that the patient, a young woman employed as housemaid, does not now experience the slightest symptom denoting the existence of her former ailment. In the event of encountering difficulty in effecting dislodgement, instead of adopting any complicated mode of procedure, I would, therefore, rest satisfied with applying a compress and bandage to retain the body in contact with the wound which has been made in the synovial membrane, with the view of promoting union between the respective surfaces, and thus occasion a degree of fixture sufficient to prevent future trouble.

GELATINOUS DEGENERATION OF THE SYNOVIAL MEMBRANE.

The synovial membrane is liable to a process of morbid nutrition, which changes its natural structure into a soft grayish-yellow gelatinous mass, varying in thickness from a line to half an inch or more. This alteration usually occurs in individuals who are disposed to scrofulous action, whence it is generally named the Scrofulous affection of the synovial membrane. Though met with at all periods of life, it most frequently commences in young persons before the age of puberty, and is generally induced by some local cause of irritation, though there are many cases in which its origin seems to be entirely spontaneous.

The first symptoms of the disease that attract attention are swelling and diminished mobility of the joint affected. The swelling is soft, elastic, and colorless, and is diffused over the whole extent of the synovial membrane which does not cover the articulating cartilages. As the morbid thickening increases, the degree of enlargement and stiffness keeps pace with it, but still the patient hardly complains of pain. If the parts be examined by dissection during this stage, the synovial membrane is found more or less thickened, gelatinous, and vascular; the surrounding cellular substance is greatly thickened and condensed by albuminous effusion into its interstices, and the ligaments do not

* Dublin Journal of Medical Science, 1847, p. 35.

present an outline so distinct as usual, being matted together with the adjacent tissues. The joint may remain thus altered for months, or even years, without suffering any farther changes; but the diseased condition at last terminates either in absorption or suppuration. In the former case the articulation is restored more or less completely to its previous condition, but almost always continues somewhat swelled and stiff; in the latter, openings into the joint are formed for the discharge of matter, the articular cartilages exfoliate or are absorbed, the cancellated structure of the bones is exposed, and the patient, if not relieved, either dies hectic, or recovers with a limb rigid and shriveled. Instead of the joint, there is then either a perfectly unyielding union by osseous matter, which is named Anchylosis, or a firm fibrous bond of connection, constituting what is called false Anchylosis.

The treatment of the disease in its first stage ought to be directed with the view of preventing inflammation, inducing it to terminate in resolution if actually existing, and promoting absorption of the morbid structure. In attaining the first of these objects, it is necessary to protect the joint concerned from all irritations, both direct and indirect. Not only strains, blows, and violent exercise should be avoided, but also motion of any kind or degree; to prevent which the more effectually, splints of leather may be advantageously employed, the limb being fixed in that position which will render it most useful to the patient after the cure is completed. The various actions of the system should be supported by a moderate allowance of nourishing food, by exercise of such kind as will not derange the affected limb, and by medicine when it is found necessary. Should inflammation be unfortunately excited, leeches, cupping, fomentations, and general remedies, if the severity of the symptoms seems to require them, must be promptly and freely resorted to. In promoting absorption, the general principles which have been already explained will indicate the proper course to be pursued. Pressure, ointments of iodine with mercury, and lotions, afford the most powerful means for this purpose. Mr. Scott has lately brought the advantages of pressure very prominently forward, and led many people to believe that in this, as well as some other chronic affections of the joints,it may be deemed an almost certain remedy. Sir B. Brodie seems to have gone into an opposite extreme in regarding the disease as incurable, and all the remedial measures proposed for its removal as at best only palliative. Pressure is apt to occasion pain, and by thus exciting irritation, give rise to inflammation, so as to hasten on the malady to its last stage; it ought, therefore, to be employed with great caution. The best plans of treatment are, after subduing any inflammatory symptoms that happen to exist, to apply pledgets of lint, covered with an ointment composed of camphorated mercurial ointment and hydriodate of potass, and

surround the limb and joint with a common roller, applied so firmly as to effect the desired degree of compression; or to keep the joint constantly moist with some discutient lotion.

[The irritating plaster is preferable by great odds to the iodine and mercury above recommended. Mr. Syme would no doubt have adopted such a substitute had he been familiar with its action. It will be understood by the readers of this work, that Eclectic physicians and surgeons do not use mercury under any circumstances; hence the attempt to modify and correct the practice of Mr. Syme.—R. S. N.]

The former method is best suited to cases of a truly chronic kind, and the latter to those in which there is some tendency to excited action. Mr. Scott recommends slips of plaster instead of the roller, and changes them not oftener than once in several weeks. But this practice seems objectionable on several grounds, since inflammation may thus be very easily overlooked, and allowed to proceed at length to suppuration before it is discovered; and if things go on well, it is obvious that in a very short time the diminution of the swelling must render the bandage loose and inefficient. Any degree of pressure may be effected with the splints and roller; it may be readily changed; and being frequently removed, prevents the inconveniences which have just been mentioned. The joint should always be restrained from motion by a splint, which may be made of leather or pasteboard, or iron wire, covered with chamois leather. The last mentioned splint, which I have found extremely useful in treating affections of the joints, may be easily constructed by bending a piece of strong wire to the shape of the limb, so as to extend along both sides of it—and then joining as many pieces transversely as seem necessary to give sufficient strength—after which the apparatus merely requires its leather covering, between the layers of which some cotton or other soft substance may be placed.

When suppuration ensues, free vent ought to be afforded to the matter. Stimulating washes should be applied to the sinuses, and moderate pressure still carefully continued, together with, if possible, even more rigid abstinence from motion. If the patient's strength proves inadequate to support the profuse and long-continued discharge which is apt to result, he must be relieved by amputation, or excision of the diseased bone. It might be thought that the diseased synovial membrane would oppose the completion of a cure, even after the carious bone was eradicated, but experience has proved this to be not the fact; and all trace of the morbid structure in question soon disappears during the suppuration which succeeds the operation.

ULCERATION OF THE CARTILAGES OF THE JOINTS.

The cartilages which cover the surfaces of articulation are often found to be destroyed more or less completely, becoming in some cases merely thinner than usual—in some rough and irregularly abraded—and in others detached from the bone, so as to lie in their natural situation, but nearly or altogether loose. These changes are ascribed to a process of absorption in the cartilages, commencing either on the surface of the synovial membrane which lines them, or in the substance of the cartilage. Ulceration of the cartilages occurs at all ages; but is more common in adults than the disease which originates in thickening of the synovial membrane. It is met with both in persons of scrofulous constitutions, and in those subject to rheumatism, but chiefly in the latter. The exciting causes are irritations of various kinds, both direct or indirect, such as strains, bruises, and exposure to cold. It is indicated by deep-seated gnawing pain, often referred to one particular point of the articulation, aggravated by motion, and felt most severely at night. The patient also generally complains of a pain in the joint beyond the one affected, or in more distant parts of the limb, which is usually throughout its whole extent more or less weak, œdematous, and cold. There is little swelling in the first instance, and no great degree of it subsequently, unless thickening of the synovial membrane be associated with abrasion of the cartilages, which is not unfrequently the case. When there is no swelling from this source, the enlargement that does take place is confined to the immediate neighborhood of the joint, and is of a more firm, unyielding consistence than that accompanying the other disease, as it depends merely on thickening and condensation of the cellular substance.

Ulceration of the cartilages sometimes causes such violent pain and hectic irritation of the system, as to require amputation even while the parts remain in the state that has been described; but, in general, it either goes on to suppuration, or terminates in recovery. When suppuration takes place, the joint passes into nearly the same condition as that which exists in the last stage of the disease originating in the gelatinous degeneration of the synovial structure, so that it would be difficult to discover from dissection where the morbid changes had commenced; and the case admits of cure only by anchylosis. When the disease terminates favorably before suppuration, some stiffness of the joint almost always remains. It appears that the articulating cartilage is never restored, whether it has been removed by interstitial absorption, or destroyed by ulceration, and that the osseous surfaces deprived of it either unite together by means of a fibrous or bony medium, or become extremely hard, and perfectly smooth, so that they

seem as if incrusted with porcelain. This Porcelanous alteration of the articular surfaces has been only lately noticed, though far from rare in its occurrence. The corresponding bones are often grooved and ridged, so as to allow of motion in only one direction, and there is always an effusion of new osseous substance around the margin of the joint, as if an attempt had been made to effect anchylosis. It may be regarded as a substitute for the cartilage in facilitating motion, and is observed occasionally in the new joints resulting from dislocation. If the stiffness depends on true anchylosis, or osseous union, it does not admit of any remedy, but when the connection is of a fibrous kind, much may be done to increase the degree of mobility.

In conducting the treatment of this disease, the first object is obviously to protect the joint from all irritations tending to render the morbid action more acute, and hasten it on to suppuration. For this purpose, perfect rest, insured by means of splints and bandages, together with strict attention to the various secretions, ought to be particularly insisted upon. The next, and not less important object, is to subdue the chronic inflammation, or ulcerative action, which is going forward. With this view, all sorts of counter-irritation are in common use; but it appears that the choice of them need not be very extensive, if due regard be paid to their effects. Issues have unquestionably most power in checking and subverting the morbid action, but the means by which they are opened is not a matter of indifference. Caustic, moxa, and the actual cautery, may all be employed for the purpose, but the last-mentioned agent is infinitely preferable to the others. It is often thought that the pain which attends the opening of the issue, affords all the benefit that is derived from it, and that, therefore, the moxa, which usually produces a superficial effect, should be selected. But it is well ascertained that any considerable amendment can, in general, be hardly perceived, until the discharge of the new secreting surface has been fairly established. The ulcers of burns are always very slow in healing, and hence an obvious advantage of the cautery over the caustic; but its chief recommendation is the result of experience, and this is so strong as to leave no room for doubt or hesitation in preferring it to the other means. When the cautery is used, an eschar, three or four inches long, should be formed on each side of the joint. In mild cases, some more gentle counter-irritant, such as the ointment of tartrate of antimony, occasionally proves sufficient; and in these, as well as those in which convalescence is advancing, the forcible aspersion of warm water by pumping, or pouring from a height, is attended with much benefit. To remedy the rigidity that remains after recovery, steaming with the vapor of hot water, frictions with gently stimulating liniments, shampooing, and persevering exercise, are the means that ought to be employed.

[The most efficient remedy for rendering the joint supple, is a liniment composed of oil capsicum, olive oil, and oil turpentine. It is surprising what an effect this combination has on anchylosed joints.—R. S. N.]

NERVOUS OR HYSTERICAL AFFECTIONS OF THE JOINTS.

Young women, particularly those of the higher ranks, are apt to suffer from painful sensations in the joints, which closely simulate the symptoms of articular disease connected with alteration of structure, and consequently are apt to lead to treatment no less unnecessary than injurious. Counter-irritation and confinement in such cases tend to increase the constitutional derangement which gives rise to the complaint, and ought, therefore, to be carefully abstained from, unless it may be thought necessary to make an impression, in the first instance, on the patient's mind by some active measures. In general, the proper course is to pursue an invigorating mode of life by using the shower-bath, taking the preparations of iron, and regularly exercising the limbs as well as the body. The spine, knee, hip, ankle, and wrist-joints, are the most common seats of this troublesome affection.

In respect to its diagnosis, the absence of swelling, or any other symptom except pain, together with the time of life and general condition of the patient, constitute the best marks of distinction from structural derangements. Sir B. Brodie, to whom the profession are much indebted for the attention which he has directed to this form of nervous disease, considers, as one of the best characters for its recognition, the sensibility of the patient to impressions on the surface of the joint that cannot possibly affect the condition of the articulation, pinching the skin being equally effectual for causing wincing, as moving the limb or pressing the articular surfaces against each other. The whole system is usually observed to be in a highly sensitive excitable state; but sometimes presents all the characters of perfect health. The uneasy feelings, though frequently remaining months or years, generally commence and disappear suddenly—whence empiricism is afforded a good field, which has been diligently cultivated.

WHITE-SWELLING.

The expression White-Swelling has been long used to denote chronic enlargements of the joints; and though dropsical swellings had been previously excluded from this comprehensive signification, it was reserved for Sir B. Brodie to ascertain that the disease originated in three different seats, and to point out the signs by which they might be distinguished. Gelatinous degeneration of the synovial membrane, ulceration of the articular cartilages, and suppuration of the heads of the bones, are now known to occasion the affections in question. The symptoms and treatment of each have been already

explained; and from these the requisite combination of practice will readily suggest itself, when there are indications of the co-existence of the affections.

MORBUS COXARIUS.

The morbus coxarius, or hip-disease, is an affection of the hip-joint, which requires separate consideration, not on account of any peculiarity in its nature, but from the frequency of its occurrence and importance of its effects. It prevails in cold moist climates, and attacks chiefly children between the ages of seven and fourteen, though it is not unfrequently met with both before and after this time of life. The first symptom complained of is generally pain of the knee, which often exists for months before any indication can be perceived of the true seat of the disease. Sooner or later the patient is observed to walk awkwardly, and less vigorously than usual; and when the circumstances on which this difference depends are investigated, it appears that the affected limb is elongated and emaciated—that the convexity of the hip is flattened, so that the sulcus between it and the thigh is less distinct and more oblique in its direction—and that in standing the foot is advanced a little with the toe slightly everted, and that the patient does not rest his weight upon it. Pain is now felt in the hip-joint itself, and though aggravated by motion, often becomes more severe from time to time without any such cause of irritation. It is most apt to do so during the night, particularly when the weather is wet and changeable. In this second stage, the disease remains generally several months, and sometimes a year or two. At length the symptoms which have been mentioned either disappear, and the limb recovers its former condition, or they are succeeded by others still more disagreeable. In the latter case the limb becomes considerably shorter than the sound one, its mobility at the same time being much impaired or altogether destroyed, and permanent eversion or inversion taking place. Collections of matter now generally make their appearance, most frequently pointing on the outer side of the thigh below the trochanter major, but occasionally in the groin or hip, and issue externally through openings formed either by ulceration or artificially by the surgeon. The patient then, after a tedious illness, becomes hectic and dies; or recovers with a stiff anchylosed joint and a wasted useless limb.

Such being the insidious and destructive progress of the morbus coxarius, it is evidently of much consequence to ascertain the nature and most efficient treatment of the disease. As opportunities of dissecting the parts in the first and second stages of the morbid process very seldom occur, being confined to those cases in which the patient dies of some other disease, the origin of the evil is still involved in considerable obscurity. Different authorities accordingly refer it to

thickening of the synovial membrane, ulceration of the cartilages, and inflammation of the bones. But though the second of these opinions be the one generally received in this country, there seems good reason for considering the one last mentioned as nearer the truth. The facts that have been collected by actual examination are in favor of this view, and the symptoms observed externally all lead to the same conclusion. The long existing pain at *distant* parts of the limb, before any trace of disease at the part really affected can be observed, is strongly characteristic of chronic inflammation in the osseous tissue; the freedom of motion without any crepitus, that continues during the second stage, is hardly reconcilable either with ulceration of the cartilage, or thickening of the synovial membrane; and the dissections that have been recorded, in which the bones were found principally affected, afford a strong proof that they are the original seat of the malady. In the third stage, there is unfortunately no want of opportunity for investigation by the knife; but then, as always happens in diseases of the joints which have advanced to suppuration, the whole articular apparatus is so involved in the destructive process, that the part primarily affected cannot be recognized. In three cases which I have dissected at the beginning of the third stage, that is, after suppuration, but before the matter was discharged externally, the articular cartilage was sound everywhere, both on the head of the femur and on the acetabulum, except a small portion not so large as a sixpence at the center of this cavity, where it was removed, and allowed a probe to pass into, or rather through, the bone. In one of these cases the synovial membrane was gelatinous, but not to any considerable extent. That cases of ulceration of the cartilages of the hip-joint do occasionally occur, there can be no doubt, both from the symptoms and dissections that have been observed; but that these bear a small proportion to those in which the disease originates in the bone seems no less certain.

The disease may then be regarded as in general consisting primarily and essentially of chronic inflammation in the bones composing the joint, of which the pelvic portion usually suffers more than the femur; and the practice proper for subduing it is consequently that which has been found most efficacious in the treatment of such affections of the articular apparatus. When the symptoms are not severe, as is usually the case in the early stage, perfect rest alone is required, though it may be prudent also to apply occasionally a few leeches to the groin. For preventing motion nothing answers so well as the long splint, applied in the same way that has been advised for fracture of the neck of the thigh-bone, no extension being effected, but merely complete fixture of the limb in a line with the trunk of the body. But if the pain is severe, so as to disturb the patient's sleep, or continues after the

means just mentioned have been employed, recourse must be had to a more efficient mode of treatment. This is counter-irritation, and though the various methods of effecting it by blisters, setons, caustic issues, and moxa, are all occasionally beneficial, the actual cautery ought always to be preferred as the most powerful means that can be employed. The best place for applying it is the hollow between the trochanter major and the tuberosity of the ischium, when a broad eschar, several inches in length, should be formed. The patient must be kept perfectly quiet during the cure, which generally requires several months. He seldom experiences much benefit until the slough separates, and the ulcerated surface begins to discharge freely. Should there appear any tendency to heal prematurely, it may be easily checked by applying some diluted ointment of cantharides; and if the sore remains open after the diseased action seems to be at an end, some astringent wash, such as the solution of the acetate of lead, should be applied to promote its cicatrization.

[Put the patient on a strongly alterative and tonic course, and persevere in the use of the irritating plaster—this course being by far the best that is known.—R. S. N.]

When the disease goes on to suppuration in adults, the case may be considered nearly hopeless, as caries then almost always ensues, and being seated in a part where excision cannot be performed, inevitably proves fatal to the patient sooner or later. In children the chance of recovery is much greater, but the limb in this case remains small, rigid, and distorted, the toes being turned sometimes inward, sometimes outward. When the head of the femur is little affected, and the ravages of the disease, as usually happens, are chiefly exerted on the acetabulum, the thigh is rotated inward, and presents nearly the same appearance as that which results from ordinary dislocation on the ilium. But when the head of the bone is destroyed by ulceration or interstitial absorption, the various muscles tending to effect rotation outward, being no longer opposed by the usual mechanical resistance, draw the limb into nearly the same position which follows fracture of the neck of the femur, and point the toes outward.

EXCISION OF THE JOINTS.

It has been explained in regard to the treatment of caries, that the only remedy for this diseased action is the removal of the affected portion of the bone. Amputation has until lately been regarded as almost the only means of relief from carious joints. But it is now ascertained by experience, that, on some occasions, the limb may be saved by cutting out the articulation. The softened, discolored, and ulcerated integuments, the thickened and indurated cellular substance, and the gelatinous synovial membrane, are found to afford no serious

obstacle to recovery, provided the whole of the bone, so far as it is actually carious, be taken away. The operation requisite for this purpose, though severe, is not more dangerous than amputation, because the joint, previous to its performance, has been opened by the disease; the whole of the articulating tissues which are apt to suffer violent inflammation when irritated, are either previously destroyed or removed; the great bloodvessels and nerves are not interfered with; and the patient is not subjected to the shock which is caused by taking away a limb.

As to the joints which may be subjected to this operation, it is evident that the extent to which the acetabulum is almost always affected in the hip-disease forbids any attempt at excision. Though experience has not yet fully decided whether the limbs that might be preserved by cutting out the knee and ankle-joints would be preferable to the artificial substitutes which may be worn in their stead, it seems pretty well ascertained that they would not. The wrist also, from the number of bones, and complexity of articulations entering into its formation, together with the numerous tendons, arteries, and nerves passing over it, does not seem to be within reach of the operation. But the elbow and shoulder-joints, while their structure and situation are most favorable for excision, hold out the greatest inducements to effect their removal without performing amputation. In all ranks and circumstances of life, the use of the hand is of great consequence, and though the elbow or shoulder were to remain perfectly stiff and motionless, yet, if the hand could be preserved entire and serviceable, by excision of these joints, it would be infinitely preferable to do so instead of taking away the limb. But it has been proved by numerous facts, that while the joints beyond the disease remain as useful as ever, the one which has undergone the operation regains such a degree of mobility and subjection to the action of its muscles as sometimes to render it hardly distinguishable from a sound one, and in general prevents it from at all impeding the use of the arm by its stiffness. There is no new joint, strictly speaking, formed, but a strong fibrous substance unites the extremities of the bones, and by its flexibility allows them to move within proper bounds; while the muscles cut across in the operation obtain new attachments, so as to perform their usual office.

[The subject of excised joints has been already treated, but as these remarks are an addition rather than a repetition of the former articles, I retain them, as being of intrinsic value.—R. S. N.]

SHOULDER-JOINT.

Different methods have been followed in cutting out the shoulder-joint, but it will be sufficient to describe the one which appears to be

the most convenient. The patient being seated on a chair, and properly supported, the surgeon introduces a straight, sharp-pointed knife under the acromion, thrusts it down to the head of the humerus, and then cuts perpendicularly, close upon the bone, nearly as far as the attachment of the deltoid. He next carries the knife backward and upward from the inferior extremity of the first incision, so as to divide the external part of this muscle, and having thus formed a flap, he dissects it from the subjacent parts, so as to expose the articulation. In order to detach the head of the humerus, he cuts transversely into the joint, introduces the fore-finger of his left hand, and using it as a guide for the knife, separates the attachments of the muscles, which are inserted into the greater and smaller tuberosities. The arm being then drawn across the breast, the head of the bone protrudes through the wound, and being grasped in the hand, may be readily sawn off. The glenoid cavity should next be examined, and taken away as far as seems necessary. The whole of the surface covered with cartilage should always be removed, and in general this will be sufficient; but sometimes the caries extend farther into the bone, and in this case must be carefully followed out by the pliers or gouge.

The only artery cut during the operation that in general requires a ligature is the posterior circumflex. The edges of the wound should be stitched together, and some light dressing having been applied, the arm ought to be supported by a spica bandage and sling.

The patient need not be confined to bed beyond a day or two, or so long as the fever excited by the operation continues; and when the wound begins to heal, he must gently exercise the limb to prevent it from becoming stiff.

The credit of performing this operation for the first time has been ascribed to Mr. White, of Manchester; but there seems good reason for believing that the case being necrosis, not caries, he merely removed part of the exfoliation before it had become detached from the living bone. The patient was a boy fourteen years of age, who "had been suddenly seized about a fortnight before with a violent inflammation in his left shoulder, which threatened a mortification, but at last terminated in a large abscess, which was opened with a lancet a few days before his admission." Through this opening, and another that had formed spontaneously under the acromion process, the *os humeri* could be felt and seen "totally divested of its bursal ligament."

Mr. White made an incision from the acromion process half-way down the arm, protruded the head of the bone through the opening thus obtained, and sawed it off. At the end of two months he found that a large piece of the remaining bone had become loose, and easily removed it with a pair of forceps. The patient was perfectly cured at

the end of four months from the operation. The arm was then not quite an inch shorter than the other, and he had the perfect use of it. In a work published some years ago,* I expressed my persuasion that this was not a case of caries, as it had generally been regarded, but one of acute necrosis; and the following very curious companion to it at a more advanced stage, seems strongly corroborative of that opinion.

Thomas Cairns, aged thirteen, from Saline, recommended by Mr. Craig, Ratho, was admitted into the Infirmary, on the 30th of June, on account of a great enlargement of the right shoulder, attended with pain and discharge of matter. It was stated that, ten months before, he had fallen from a wall about four feet high among loose stones, and afterward had been pretty severely handled by a bone-setter, who alleged that the humerus was broken near the joint. Inflammation and suppuration followed, openings for the discharge of matter took place at various parts, the joint became stiff, and the patient's strength declined. In these circumstances, he was sent to town to be under my care.

As it was impossible to obtain any satisfactory information in regard to the condition of the joint by introducing a probe, I enlarged the sinus, that led most directly toward it, sufficiently to admit my finger, with the point of which the head of the bone was felt bare and smooth. The extreme firmness of the surrounding parts prevented a more free examination, but the information thus gained, together with the history of the case, convinced me that a portion of the bone was dead and detached. I, therefore, extended upward the incision already made, finding it necessary to use for this purpose both the knife and cutting-pliers, and then ascertained that the exfoliation lay loose in a bony case. Being unwilling to remove any of the new formed osseous substance which was destined to take the place of the old bone, I forcibly dilated the edges of the aperture until the shell gave way sufficiently to permit the extraction of the sequestrum, which was then easily effected. After the principal portion was removed, some small pieces were found lying in the cavity, which proved to be fragments of the dense plate that had formed the convex surface of the head of the bone. The glenoid cavity of the scapula was divested of cartilage, but covered with a smooth, firm, velvet-like lining of granulation. Recovery was delayed by unhealthy action of the sore, which assumed a phagedenic, and afterward a sloughing character, but was so far completed on the 7th of September that the boy returned home with an arm not perceptibly shortened, and, though still stiff at the shoul-

* Treatise on the Excision of Diseased Joints. [Now embodied in this work.—Ed.]

der, nearly as useful as ever. I saw the patient lately, grown up to be a strong, active man.

In 1826, I operated on a shoulder-joint which had been diseased for upward of seven years, and had reduced the patient, a female between thirty and forty years of age, to the greatest degree of exhaustion. The head of the humerus was completely excavated and carious, and presented a most favorable opportunity for excision. Recovery was soon completed, and for many years afterward, until she died of some other complaint, the poor woman was enabled to lead an active industrious life, with the full use of her arm for all ordinary employments. The success of this case rendered me sanguine for the future; but I regret to say that results so satisfactory bear a small proportion to those in which, from extensive affection of the scapula, the operation proves abortive; and wherever there is ground for suspecting the existence of this obstacle, from the situation of sinuses, or the information obtained by probing, amputation ought to be preferred.

ELBOW-JOINT.

The best mode of performing the excision of the elbow-joint is that which was originally contrived and practiced by Moreau. The patient should lie with his face downward, so as to present the posterior surface of the joint. The surgeon using the same kind of knife which was recommended for the former operation, makes a transverse incision into the joint, close above the olecranon, and extending from the inner edge of this process to the external tuberosity of the humerus. It is necessary in doing this to be careful to avoid the ulnar nerve, which lies close upon the inner side of the olecranon, and the safest plan is to thrust down the knife perpendicularly into the joint, with its back directed toward the nerve. At each extremity of the transverse cut thus made, the surgeon next makes an incision about an inch and a half long, both upward and downward, in the long direction of the limb, so as to form two square flaps, and give the form of the wound a resemblance to the letter H. These flaps being detached from the parts below them, the olecranon may be easily removed by the saw or pliers, after which no difficulty will be experienced in cutting the lateral ligaments of the joint, protruding the extremity of the humerus, and sawing it off through the tuberosities. Lower than this would not be sufficient for removing the whole of the cartilaginous surface, and the caries very rarely extends higher up. The head of the radius may next be cut away with the pliers; and then nothing remains to be done but the separation of the portion of the sigmoid cavity of the ulna that was left after the removal of the olecranon, which may now be readily effected by the pliers. It might be thought better to take away all of the ulna that required excision at once,

but the attachment of the *brachialis internus* to the coronoid process renders this very difficult, especially if it is attempted before the free space afforded by the removal of the other bones is obtained. After the olecranon, and the extremities of the humerus and radius are detached, it is easy to cut out with the pliers any more of the ulna that may be required.

In determining on the extent to which it is necessary to remove the bone, the truly carious part must be carefully distinguished from the rough and thickened state of the neighboring bone, which depends upon the effusion of new osseous substance, in consequence of the disease causing irritation. When we read of the humerus being cut out to the extent of *four inches*, it may be safely concluded that this discrimination has not been duly regarded.

It is seldom necessary to tie any arteries; but if a disposition to bleed should be observed when the operation is finished, the vessels ought to be sought for and secured, as the hemorrhage, when allowed to continue, produces very disagreeable effects, by distending the wound, separating its edges, and causing great irritation. The wound should be closed with stitches of the interrupted suture, and then a long bandage must be applied in the figure of 8 to support the limb, which should be bent at a right angle, and to prevent the ends of the bones from moving, or pressing injuriously on the soft parts. Rigid cases of iron or wood have been proposed for this purpose, but they are found to be in all respects less convenient than the means just mentioned. The patient, after the first two or three days, will find himself most comfortable in the erect posture; and when the inflammatory tension, consequent upon the operation, begins to subside, he should gently, but diligently, exercise the limb, so as to preserve the mobility of the elbow.

The cases admitting this operation are much more frequent than those proper for excision of the shoulder-joint. Having adopted the practice when it was almost entirely neglected in this country—where, indeed, I am not aware of its having been ever previously performed on the living body—and employed it very extensively, as well as successfully, I feel great pleasure in contemplating the benefit that has been derived from its introduction into general use. If the patient, from weakness, seems unable to bear a protracted discharge, or if the bones are found excavated or diseased beyond the limits of the articulating extremities the limb should be removed.

CHAPTER XV.

MUSCLES.

INJURIES OF MUSCLES.

The muscular tissue is not by any means prone to diseased action, and, in general, suffers little irritation from the injuries to which it is subjected.

WOUNDS.

An incision in the long direction of a muscle occasions very little inconvenience, and the wound heals without any remarkable difference from one confined to the integuments. But if the muscular fibers are divided transversely, their contractility causes a separation of the sides of the wound, more or less considerable, according to circumstances. No new muscular substance is ever formed to supply the defect, and it consequently remains permanent, the intermediate space being occupied by a dense fibrous substance. The muscle concerned is, for a time, rendered weak in action, owing to the relaxation of its fibers; but, in general, it gradually becomes accommodated to the change, and acts with its former vigor.

In order to prevent this separation of the cut extremities as much as possible, the patient should be made to assume such a position as will most effectually relax the injured muscles. Sutures would have little effect in counteracting the retractile tendency, and it is not thought right to employ them, lest they should excite irritation. Punctured wounds of muscles are frequently followed by diffused inflammation, and extensive suppuration; but these effects are to be ascribed to the form of the wound, and the thick fascia which it generally penetrates before reaching the muscle. In gun-shot wounds, and extensive laceration of the muscular texture, a troublesome degree of swelling is apt to proceed from expansion of the soft or vascular substance concerned, and requires the pressure of carefully applied bandages.

RUPTURE AND STRAINS OF MUSCLES BY THEIR OWN ACTION.

The complete rupture of a muscle by the overaction of its own contractile power is an extremely rare occurrence. Instances of it have, however, been observed in the recti muscles of the abdomen and *rectus femoris*. The symptoms are sudden inability to perform the accustomed motions, and a vacuity perceptible on external examination of the part affected. The treatment consists in approximating

the ruptured extremities as much as possible by the position of the patient, and by bandaging. When the parts become consolidated, the usual power is regained.

Partial rupture of muscles from violent exertion is far from being uncommon. The situation in which it occurs most frequently is the calf of the leg, where the *soleus* is apt to have some of its fibers torn during extension of the ankle-joint. This is more apt to happen from an inadvertent than a voluntary violent exertion, and generally occurs without the patient being aware of making any effort. The symptoms are a sudden sensation similar to that which would be caused by a blow on the injured part, succeeded by severe pain, and inability of using not only the muscle injured, but also those associated with it in action, together with swelling and ecchymosis of the limb. The treatment consists in maintaining perfect rest, using warm fomentations while the pain continues, and then applying moderate pressure by means of a bandage, together with lotions or liniments, such as the solution of acetate of lead with opium, or the tincture of soap and opium. The cure is more or less tedious, according to the extent of the injury; and requires from a few days to as many months for its completion.

Strains without rupture are not unfrequently occasioned by violent muscular action. The patient suffers severe pain at the injured part, and is unable to perform almost any motion with the affected muscles. In a day or two the pain subsides; but weeks often elapse before the original strength is regained. This accident is most apt to happen in the loins, where the long muscles of the back are subjected to violent exertion in lifting heavy weights, etc. The treatment requires, in the first instance, repose, warm fomentations, and sometimes the local abstraction of blood. After the pain has ceased, or has lost its intensity, friction, with some stimulating liniment, and the support of a flannel bandage, are the best means that can be employed.

[I should prefer to paint the injured muscle with muriated tincture of iron from the first, and to rely as much upon rest as upon any agent that might be recommended.—R. S. N.]

Dislocation of a muscle is met with only in the case of the *latissimus dori*, and here very rarely. The portion of this muscle which lies over the inferior angle of the scapula, and braces it to the chest, seems, especially in weak relaxed individuals, so loosely connected with the bone, that a very slight force would be sufficient to cause its displacement downward. Such a dislocation does accordingly sometimes happen, but so seldom, that few practitioners have an opportunity of seeing more than one or two instances of it. The accident is easily recognized by the projection of the lower extremity of the scapula; particularly when the arm is raised or separated from the side.

All attempts to replace the muscle in such cases have proved unavailing. And the only remedy that can be advised, is a bandage to press down the bone, and promote the formation of new adhesions between it and the muscle.

DERANGEMENTS IN THE NUTRITIVE AND FUNCTIONAL ACTIONS OF MUSCLES.

It has already been observed, that the muscular tissue is little disposed to morbid action, and though diseases sometimes extend into it from the neighborhood, there is no part of the body in which alteration of structure so rarely originates. The carcinomatous and medullary sarcomatous degenerations sooner or later engage every structure that lies near the one in which they originate, and the muscles are not spared. Scrofulous tubercles occur in every tissue, but are rarely met with in the substance of muscles. Fibrous tumors have been met with in the muscles, but still more seldom.

Absorption sometimes occurs in muscles so as to occasion an atrophy or wasting of them. This occurrence may be confined to a single muscle or affect a whole group of them. It is generally induced by some irritation, as that of a blow or irritating wound. The pricks sustained in dissecting have led to such consequences. There does not seem to be any efficient means of preventing or removing this morbid action when it has commenced.

The functional action of muscles depends very much upon the nervous system; and derangement of it is to be regarded, in general, rather as symptomatic of changes in the condition of that important system, than indicative of any alteration in the organs with which it is more immediately connected.

It sometimes happens, however, that inordinate disposition to contract, and also in other cases deficiency of contractile power are met with, when the muscles themselves appear to be the seat and cause of the disease. One muscle, or a group of muscles, occasionally contracts with unusual energy, and either without any, or with very imperfect intermissions of relaxation. A permanent deformity or unusual position of part of the body is thus caused, which becomes increased in degree from time to time owing to paroxysms of contraction. These paroxysms are extremely variable in their frequency and duration. They often occur without any assignable cause, but are usually induced or aggravated by irritations, whether of body or mind.

The muscles affected in course of time enlarge, and project more than is natural; they are also the seat of uneasy sensations, and are painful on pressure. This morbid action of the muscles is most frequently met with in the neck, especially in the sterno-mastoid. It then occasions one kind of wry-neck, the head being turned habitually to the opposite side.

The treatment of this disease consists in removing all sources of irritation, whether direct or indirect, that may be discovered to be in operation. The state of the various secretions ought to be carefully inquired into, and rectified if deranged. If there are symptoms of local irritation, leeches, warm fomentations, and anodyne liniments should be applied over the seat of the disease; and if these means fail, blisters and acupuncturation may be tried.

Single muscles, or groups of muscles, are more frequently met with in the opposite state to that which has just been described, their power of contracting being much diminished or altogether lost. The muscles of the face and fore-arm are most subject to this affection, and they suffer from it variously, both as to degree and extent. At one time it is the flexors alone, at another the extensors, and in some cases both together, which lose the power of action. The cause of this condition is sometimes a blow, when the cure is usually tedious and imperfect. All that can be done is to use fomentations, frictions, and persevering attempts to exercise the muscles. The causes more frequently concerned are exposure to cold and long-continued pressure, and both of these often seem to be conjoined in producing the effect; as the most common history of the disease is, that the patient fell asleep in the open air, or in some unusual situation, and rested his head on one arm. In such cases the cure is in general readily accomplished by applying a succession of blisters along the course of the affected muscles.

CONTRACTIONS OF MUSCLE—CLUB-FOOT—WRY-NECK—STRABISMUS.

In addition to that temporary or spasmodic contraction which has been already mentioned, the muscles are liable to a permanent shortening of the natural length, necessarily producing deformity, as well as causing inconvenience from restricting motion. Such contractions of the muscles are occasionally congenital, as in the common case of club-foot, which depends not on any faulty conformation of the bones, but upon a want of due balance in the muscular powers of the limb. In general the foot is turned inward (*Varus*); but sometimes, though very rarely, it is found in the opposite direction (*Valgus*). The foot may also be maintained in a state of extension without any lateral inclination (*Pes equinus*); but this condition is hardly met with as a congenital derangement, and usually occurs in childhood, especially during the period of teething, or after an attack of the exanthematous diseases to which that age is liable.

[The following plates represent the common forms of club-foot, there being many varieties or modifications of all these forms. Fig. 93 illustrates the talipes equinus, in which the heel is elevated and the patient is compelled to walk on the toes or on the ball of the foot.

This form of club-foot is caused generally by the permanent contraction of the gastrocnemii muscles.

Fig. 93.

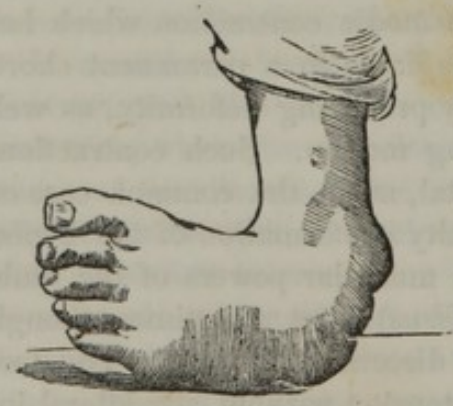


Fig. 94.



In Fig. 94, we have a representation of talipes calcaneus, a form not regarded by Mr. Syme. This form is caused by the contraction of the tabialis anticus, and the extensor muscles of the toes.

Fig. 95.



In Fig. 95, we have the talipes varus which is the most common form of club-foot. Here the patient walks on the outside of the foot, turning the great toe in. It is caused by the contraction of the adductors of the foot and the muscles of the leg.—R. S. N.]

Until recent years, the treatment of club-foot, in all its forms, was limited to the employment of various apparatus with the view of counteracting the muscles by mechanical force, and gradually elongating them so as to remedy the distortion. This process was excessively tedious, expensive, and too frequently with every care imperfect in its effect. Hence the number of adults to be seen everywhere, especially in the lower ranks of life, retaining the bones of their limbs in a perverted position, until becoming altered in their form, they constitute supports for the body of very defective utility, and no less unseemly appearance.

A great improvement has been introduced into practice by surgeons

of the present day, particularly Stromeyer and Dieffenbach. It consists in dividing the tendons of the contracted muscles, and thus at once removing the grand obstacle in the way of treatment, which, when this has been done, merely requires such a degree of mechanical support as may compensate for the state of elongation and relaxation in which the ligaments necessarily remain for a time. The sooner the operation for this purpose is performed the better; but it may be undertaken without impropriety so long as the bones have not suffered such an alteration of form as must render them unfit for assuming their natural position. Until the age of puberty it will hardly ever be found to fail if properly conducted, and in many cases, at a much later period, complete relief may be afforded. This is more especially the case in simple extension of the foot (*pes equinus*, or pointed toe), which is remedied with success in apparently the most confirmed degree, provided the astragalus is not displaced so very far forward that it does not admit of being returned into its proper position, when, though the foot might be brought nearly or altogether to a rectangular line with the leg, it could not prove so serviceable in progressive motion as in the straight direction, to which, from use, both it and the patient had become habituated.

In dividing the tendons, instruments of various shapes and sizes have been employed. A small narrow-bladed bistoury, either straight

Fig. 96.



or curved, answers very well, and in operating on infants I have found an iris scalpel very useful. An assistant should hold the foot so as to stretch moderately the tendons about to be cut, and then the operator, pinching up the integuments lying over it with the thumb and forefinger of his left hand, introduces the knife with its flat edge toward him between the skin thus elevated and the tendon. The integuments being now left free, the cutting edge is directed upon the tendon, and by a slight sawing motion, aided with pressure on the back of the blade, readily completes the section. A sudden snap, or absence of previous tension, distinctly denotes when this has been effected. A piece of dry lint is then to be applied on the puncture; and to insure healing of the wound it is prudent to afford the support of a pretty long bandage with the view of preventing motion. At the end of two or three days the foot may be placed in the boot provided for it. The best apparatus of this kind is here represented, (Fig. 97). [It is the instrument of Scarpa, than which there is none better so far as I know. It is simple and easily applied.—R. S. N.]

As to the situation of tendons for division, the circumstances of the case must of course determine. In *varus*, the *tibialis anticus* or *posticus*, and in *valgus*, the *peronei* are most frequently in fault. But when the *tendo Achillis* is felt particularly tense, it ought to be divided; and in *talipes* or *pes equinus*, nothing more is required than this. Indeed, favorable cases of the last-mentioned kind are remedied almost at once by this operation, without the assistance of any mechanical means; since the action of standing or walking is of itself sufficient for restoring the limb to its proper shape, so soon as the opposing muscular contraction is removed. In one remarkable case, where both feet were affected, the patient, a young man who was about to sail for Australia, walked without any assistance, before the end of a week after I had divided the tendons.

Fig. 97.



WRY-NECK.

The sterno-mastoid muscle occasionally becomes contracted, and causes a very awkward distortion, the head being drawn toward the clavicle on the side affected, while the face is turned in the opposite direction; and unless relief be soon afforded, the trunk is apt to suffer a degree of lateral incurvation, from the want of due balance at its upper extremity. Attempts to remedy this deformity, by division of the muscle, were made at an early period; but being effected by free incision of the integuments, proved severe in their execution, and unsatisfactory in their results. About ten years ago, I thought of performing the operation in the way of subcutaneous incision, by means of a knife so narrow-bladed as merely to puncture the skin. The patient was instantly and completely relieved, without any pain or subsequent inconvenience. It appears that, nearly at the same time, Dieffenbach had adopted this method, and that ten years earlier it had been practiced by the late M. Dupuytren. Every case of wry-neck that has come under my care since the one just mentioned, I have treated in this manner with invariable success. I have seldom found it necessary to divide more than the sternal portion of the muscle; and should advise this to be done at the distance of an inch above the clavicle. No dressing or indeed after-treatment of any kind is required, since the distorted parts soon regain their natural position when the disturbing cause of their proper balance has been removed.

Wry-neck, like club-foot, is sometimes congenital, but much more frequently, like squinting and the *pes equinus*, occurs during child-

hood, in connection with some inflammatory or feverish state of the system. It depends upon a contracted state of the sterno-mastoid muscle, which has usually the feeling and appearance of a tense cord stretching from the clavicle to the ear. The head is bent toward the side affected, the face being turned in the opposite direction. Until the introduction of sub-cutaneous incision, the treatment of this complaint was very defective, since it consisted either in the use of mechanical support, which did little, if any good, or in cutting across the contracted muscle, together with its superjacent integuments, which was a painful and bloody operation, leaving a large sore, slow to heal, and apt to renew the evil during cicatrization. The sub-cutaneous process requires merely a puncture of the skin, is not attended with pain or bleeding, needs no dressing or after-treatment, and at once affords the relief desired. The following is the first case on record of its performance in Great Britain, which I extract from my tenth report of the Edinburgh Surgical Hospital:

Matthew Cullen, aged six, Dunbar, admitted November 2. The head was much inclined to the left side, and could not be elevated, owing to the rigid contraction of the left sterno-mastoid, the sternal part of which felt like a tense cord. The complaint had existed upward of twelve months, and had resisted blisters with other similar means of remedy. In these circumstances, it was thought necessary to divide the contracted part of the muscle. This was effected by entering a sharp-pointed narrow knife a little to the inner side of its tracheal margin, about an inch above the clavicle, and then pressing the blade against the tense fibers. A sudden snap, which shook the patient's frame, was immediately perceived, and all trace of the contraction disappeared. The knife was withdrawn, and the small puncture occasioned by it in passing through the skin, afforded the only perceptible indication of what had been done. No pain or other bad consequence followed, and the cure might be regarded as at once complete.*

In the case just related, the disease existed in its simplest form, and without any spinal affection, which is seldom wanting. The affection of the spine proceeds from involuntary elevation of the shoulder on the side affected, to lessen the strain on the head. This necessarily gives the dorsal part of the spine a corresponding convexity; and the lumbar portion bending in an opposite direction, to preserve the balance of the trunk, there results a lateral curvature, in no respect different, so far as regards appearance, from its ordinary condition. I was asked, along with Sir Charles Bell, to see a young gentleman suffering from lateral curvature. Finding the right sterno-mastoid

* Edinburgh Medical and Surgical Journal, p. 115.

very much contracted, I proposed to divide it, and did so, with the effect of correcting the state of the spine immediately, so that before we left the house the youth was walking straight.

But if the distortion be permitted to continue, it sooner or later, as in the ordinary form of the disease, leads to alteration in the shape of the bones. The bodies of the vertebræ are compressed, and the sternum projects. In this case, of course, the operation cannot afford the same instant relief that follows its performance while the curvature depends merely upon muscular action. The head, however, is at once set free, to the patient's great comfort; and through the gradual improvement of time, the trunk, unless arrived at full maturity, may in a great measure regain its proper conformation. A few weeks ago, I saw, with Mr. Cruickshank, of Hill Place, a young lady from this neighborhood, on whom I performed the operation in January. The back and ribs were then so much distorted, that I hardly ventured to hope for much improvement, especially as the patient was nearly twenty years of age. It was therefore an agreeable surprise to find, instead of the low, thin, sallow, crooked, sickly-looking girl I had formerly seen, an erect, fresh-colored, happy, healthy-looking young woman.

There is still another condition of the complaint, of which I may mention an instance that came within my notice last summer, in the case of a boy who was brought from the country on account of lateral curvature. Observing that his head inclined to one side, I examined the sterno-mastoid, and found it, not tense and rigid as I expected, but soft and yielding. I perceived, however, that when an attempt was made to raise the head, the muscle resisted and became tense, and therefore concluded that it was the seat of the evil. Under this impression I proceeded to divide it, and succeeded in doing so, though with more difficulty than usual, from the want of tension, for which it was necessary to compensate, by stretching the neck. A goood effect was immediately perceptible, and the following day the patient's back was comparatively straight, which it has since, I am informed, become completely.

In concluding these remarks, it may be well to warn against mistaking for wry-neck depending upon muscular contraction, the distorted position of the head which proceeds from caries between the occiput and atlas. The latter disease, like the former, usually occurs in young persons, presents to a careless observer similar symptoms, and, if confounded with it, leads to treatment not only useless, but extremely injurious. A young gentleman had for twelve months used friction and exercise under the direction of his medical attendant, who supposed that he labored under wry-neck from contraction of the sterno-mastoid. No benefit having been experienced, it was thought

that an operation might be serviceable, and with this view I was asked to see the patient. He presented all the characters and well marked symptoms of *spondylar throcace*, or caries of the occipito-vertebral articulation, in a stage so advanced, that there was nothing left for me but to explain the nature of the case and predict the fatal termination, which soon afterward happened.

Since the publication of this paper I have operated in several other cases with the same success, and without ever causing any unpleasant symptoms. In no instance has it ever been necessary to divide both the clavicular and sternal portions of the muscle, and in the course of my experience, only one case requiring division of the former has occurred.

There is a spasmodic contraction of the sterno-mastoid, fortunately of rare occurrence, but which requires to be carefully distinguished from the ordinary form of the disease, as dividing the muscle for it affords no relief. I have met with only three cases of this kind. In one of them, the patient, a gentleman whom I saw with the late Dr. Shortt, had the sternal part of the muscle divided, together with the integuments, without experiencing any permanent benefit. In another case seen along with Sir C. Bell and Dr. Scott, I also divided the muscle, but by sub-cutaneous incision, and without any benefit at the time, although the patient, a gentleman from Roxburghshire, I have been informed, afterward recovered spontaneously. The characters which distinguish this form of wry-neck are so strongly marked, that they cannot be overlooked even by one who has not seen similar cases before.

STRABISMUS.

Strabismus, or squinting, has always been known to depend upon unequal action of the recti muscles of the eyeball, and the idea of affording relief by their division has occasionally presented itself, though not until lately carried into effect. It was only two years ago that Dr. Dieffenbach first performed this operation with success, and since that time it may be said, without exaggeration, to have been repeated in thousands of cases. The procedure being new was eagerly seized upon by the youngest and least experienced members of the profession as an unappropriated territory, which might be made their own through the claim of early possession, and the public made to believe, by newspaper advertisements and the titles of trumpery pamphlets on the subject, that the operation was somehow different in its nature from the ordinary practice of surgery—not requiring for its proper performance the usual qualifications of experience, dexterity, and judgment—and best exercised by persons having no claim to confidence in any other department of the profession. The consequences may be readily anticipated. No discrimination of cases being made, and no difference in the treatment adopted according to the variety of

circumstances; while the fundamental doctrine of invariable success opposed that fair statement of the results which might have tended to improvement, frequent failures, and the loss of not a few eyes, have brought the operation into a considerable degree of discredit. Having been, I believe, the first to divide the muscles for squinting in Scotland, and having had occasion to do so very extensively in that class of patients which not only permitted, but compelled, me to watch the progress and ascertain the final issue of the treatment, I now feel entitled to express a highly favorable opinion of the operation, provided it be conducted on proper principles; and these I will now endeavor to explain.

Strabismus is not a congenital derangement, as used to be thought, but common during infancy or the early years of childhood. It may frequently be connected with some of the febrile affections incident to this age; and though often met with in several members of the same family, cannot justly be attributed to imitation. The obliquity is, for the most part, confined to one eye, and when both are affected, they suffer alternately. In a very large proportion of cases the eyeball is turned inward to the nose, so that the leer, or outward squint, is, not seen, I should say, more than once in fifty cases. Squinting is not only unseemly in appearance, but usually attended with more or less deficiency in the power of vision — the patient being seldom able to read, or distinguish any minute objects with the affected eye. This was formerly thought to cause the complaint, but is now ascertained to be its effect, and to depend merely upon the inability of attending to the different impressions made on the eyes at the same time, when one of them being habitually disregarded, the organ ceases to be serviceable. A lady, who squinted inward with both eyes alternately, found that she saw distant objects best with one, and near ones with the other. A gentleman, who squinted outward with both eyes alternately, complained that, in driving, he felt great difficulty in avoiding obstacles from inability to judge accurately of distances. If the eyes are restored to their proper directions at an early age, the vision of both usually becomes perfect, but in elderly persons there is seldom more than a partial improvement.

The internal or external *recti* muscles occasion the obliquity, but do not effect this, as in the case of club-foot or wry-neck, by permanent contraction. The patient can usually render the eye straight by a voluntary effort, and whenever the sound one is closed, the other ceases to squint; but, if the eyelids are then suddenly opened, the eye, however straight it may ordinarily be, is found completely inverted or everted, just as the squinting one was previously. From this very curious fact it would appear, that the complaint depends upon an alteration, not in the texture or length of the muscle, but in its disposition to

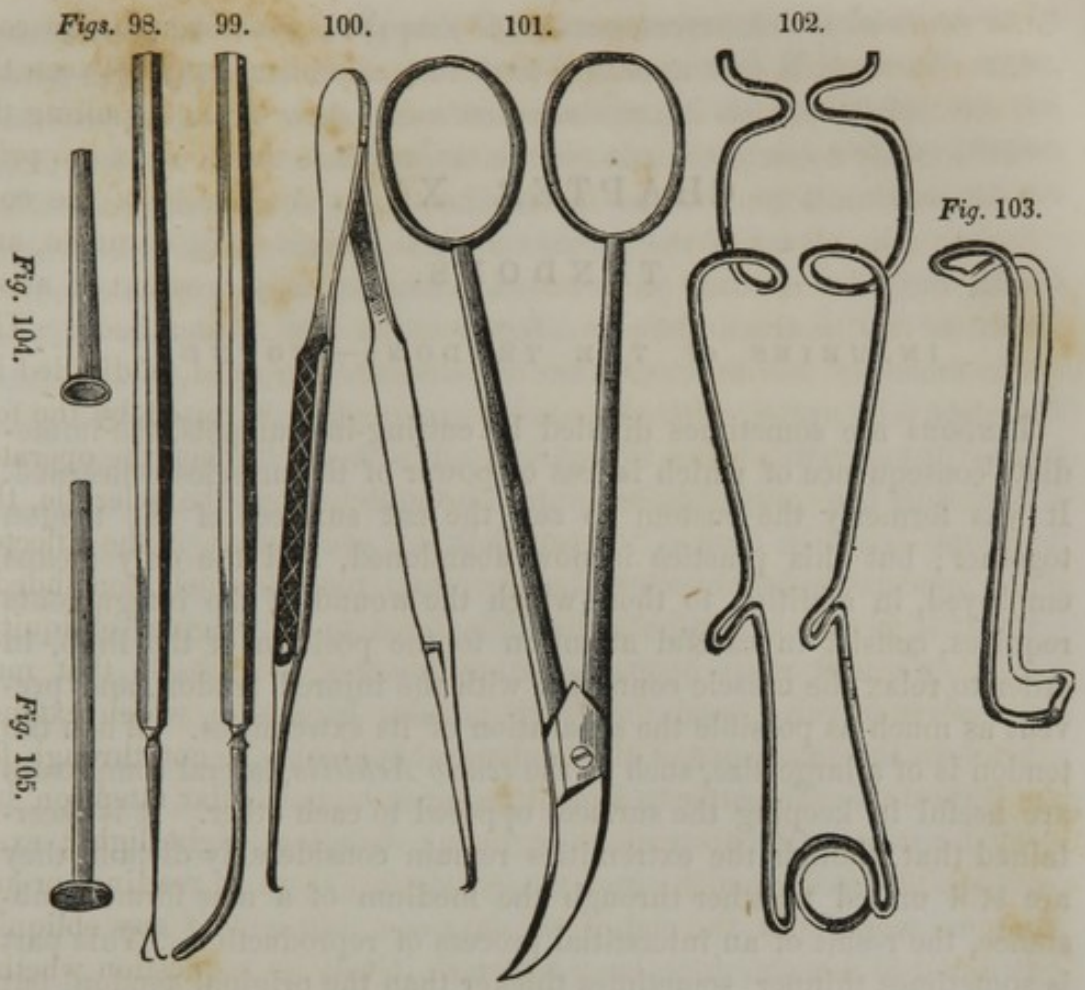
contract, or rather in the disposition to contract possessed by the two corresponding muscles, and consequently that if advantage is to be derived from division of the *rectus*, the muscle of either the straight or the squinting eye may be subjected to the operation. Another inference of more practical value, and one early acted upon by my friend and former pupil, Dr. Elliot, of Carlisle, is that in cases where complete relief has not been afforded by cutting the rectus of the squinting eye, the corresponding muscle of the other eye may be divided with advantage. In confirmation of the arrangement depending rather upon functional than organic alteration, it may be added, that most persons laboring under the complaint remark that it varies in degree with a variety of circumstances, but especially disturbance of the digestive organs. *A priori*, therefore, it might have been expected that division of the *recti* would not afford complete, or, at all events, permanent relief, since, if the tendency to contraction remained, it would reinduce obliquity so soon as the muscle acquired new attachments to the sclerotic, just as has been ascertained to happen in the spasmodic form of wry-neck. Experience, however, having happily ascertained that the operation does in general prove effectual, the theoretical objection must not stand in the way of its employment; but may account for the failures as well as relapses occasionally met with, and afford encouragement to repeat the division when it does not give all the relief desired at once.

The operation essentially requires an opening of the conjunctiva sufficiently extensive to expose the insertion of the rectus in fault, and a complete division of the muscle at this part. Various methods have been recommended for effecting this, by the use of hooks for catching the muscle as it lies in the loose texture of the orbit; but the procedure recommended by Mr. Liston, consisting in a simple secure dissection of the part, without any hap-hazard diving, has always seemed to me greatly preferable to any such uncertain and dangerous artifices. I have always, with the exception of some experimental trials in the early part of my experience, performed the operation in his way, with some little modification, and will now describe the mode of conducting it.

The apparatus required consists of two specula; a pair of common dissecting forceps; a hook; a pair of scissors, very sharp in the edge, but blunt at the point; and a small piece of sponge. There should be two assistants; one to elevate the upper eyelid, and keep the eyeball everted, and the other to depress the lower lid, and hold the sponge. The operator stands behind the patient, who is seated on a chair, unless the left eye be affected, when he ought to be in front. The first step is to insert the smaller end of the speculum under the edge of the upper eyelid, and confide it to the assistant; then to do

the same with the lower one; next to fix the hook through the conjunctiva into the substance of the sclerotic, about midway between the margin of the cornea and the *caruncula lachrymalis*, and, pulling the ball steadily so as to evert it completely, to place the hook in the principal assistant's unoccupied hand. Lastly, to raise a fold of the conjunctiva by means of the forceps applied close to the caruncle, and with the scissors cut it in a vertical direction to the extent of about half an inch in the middle line between the forceps and hook. The attachment of the muscle, being then distinctly exposed, is divided by successively cutting with the scissors portions of it raised by the forceps, just as in dissecting this part in a dead body. When the operator thinks he has completely separated the muscle from the sclerotic, the patient should be desired to open both his eyes, when, if the affected one appears slightly everted, the operation may be safely concluded; but if it is merely straight, or still inclined to its original obliquity, another search must be made for any fibers of the muscle that may remain undivided, and the tough cellular expansion, which extends between the insertions of the tendons, should also be cut through for a little way. The after-treatment requires no particular attention beyond a moderately abstemious regimen; avoiding bright light; exercising the eyes equally; and not employing them in reading, or any minute work. At the end of ten days or a fortnight, if any obliquity is found to remain, or to have returned, it will be a question whether the rectus of the other eye should be divided, or the muscle already operated on should be cut a second time. In deciding as to this, I think the best guide is the effect produced by closing the sound eye. If it is found to be altered in its position by doing so, and to present obliquity when suddenly exposed by opening the eyelids, the rectus concerned in producing this effect may properly be divided. But if it remains straight, the operation should be repeated on the squinting eye, in the hope that the antagonist muscle being afforded a second opportunity of contracting, will do so more effectually that on the first occasion. In the course of two or three weeks after the operation, a warty-looking excrescence frequently grows from the seat of the wound, and requires to be cut away by dividing its neck, which is small, and almost thread-like, with a pair of curved scissors; or, to render this unnecessary, the nitrate of silver may be applied occasionally until the conjunctiva is completely healed. If left to itself, the growth, after gradually indurating, ultimately drops off from atrophy of the nutrient vessels.

[Operations about the eye require both skill and a perfect knowledge of the anatomy of the parts. The operator should have a steady hand. The instruments required in operating for strabismus are here represented, and comprise all, and more than is actually necessary.



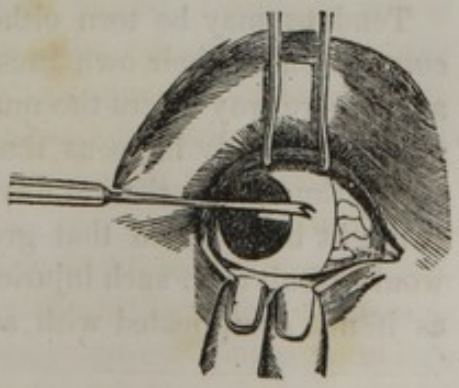
The wire specula, here represented, are the best in use for retaining the eyeball in a stationary position, and for elevating the lid.

Fig. 106.



These cuts (Figs. 106 and 107) show the applications of the two specula. Operations for strabismus are not difficult, and are generally successful. The operator should not neglect, if he is to operate on a child, to roll the patient up in a sheet, with its arms laying by its side, as otherwise it will be almost sure to seize the operator's hand, and perhaps cause him to ruin the eye.—R. S. N.]

Fig. 107.



CHAPTER XVI.

TENDONS.

INJURIES OF THE TENDONS—WOUNDS.

Tendons are sometimes divided by cutting-instruments, the immediate consequence of which is loss of power of the muscles concerned. It was formerly the custom to sew the cut surfaces of the tendon together; but this practice is now abandoned, and the only means employed, in addition to those which the wound of the integuments requires, consist in careful attention to the position of the limb, in order to relax the muscle connected with the injured tendon, and prevent as much as possible the separation of its extremities. When the tendon is of a large size, such as the *tendo Achillis*, lateral compresses are useful in keeping the surfaces opposed to each other. It is ascertained that, though the extremities remain considerably distant, they are still united together through the medium of a new formed substance, the result of an interstitial process of reproduction. This part is sometimes thinner, sometimes thicker than the original tendon, but always inconvenient by causing relaxation of the muscle, and consequent diminution in the effect of its contractile power. The surgeon, therefore, should do everything in his power to render the bond of union as narrow as possible. In cases where the wound has been allowed to heal, with such separation of the extremities of the tendon as renders the patient lame, it may be warrantable to cut out the intermediate substance, and sew the ends of the tendon together, as I once did with success in a case where the *tendo Achillis* had been divided and allowed to heal with great retraction.*

RUPTURE.

Tendons may be torn either by external violence, or by inordinate contraction of their own muscles. In the former case they are most apt to give way where the muscular fibers are attached to them, and it not unfrequently happens that the tendons of the penniform muscles of the thumb or wrist are drawn out to the extent of five or six inches. It might be expected that great irritation and diffused inflammation would result from such injuries, but the wound in general heals kindly, as if not complicated with any unusual peculiarity. It is a prudent

* Ed. Med. and Surg. Journal.

precaution, however, to oppose the commencement of inflammation by using cold applications in the first instance; and if it should occur, incisions, together with warm fomentations, if the symptoms are violent, and the latter means alone if they are moderate, will be proper. When suppuration is established, compression along the course of the sinus, stimulating washes, and bandaging are required.

Tendons are more frequently ruptured by the too energetic action of their muscles. The tendo Achillis is most liable to this accident, and, indeed, with the exception of the tendon of the extensors of the thigh, is almost the only one in which it occurs. It has been supposed that the thread-like tendon of the plantaris may be ruptured without a corresponding injury of the great tendon of the ankle, and that such is the case where patients suddenly after exertion lose the power of extending the foot, while the vacuity can be felt in the course of the tendo Achillis. But there can be no doubt that on such occasions the injury sustained is rupture of the muscular fibers, probably of the soleus. It is difficult to conceive that the loss of so small a power as that of the plantaris muscle should render the patient unable to move the ankle; and the pain, discoloration, and tedious recovery which are usually observed to attend cases of the kind in question, are additional grounds for believing that the injury is seated in the muscular tissue.

The *tendo Achillis* is usually ruptured in consequence of some violent exertion in raising the body, or preventing it from falling. The patient feels a sensation as if struck with a blunt weapon. It seems to him that his heel has sunk into a hole, and a noise as of a cord giving way is occasionally heard, both by him and the by-standers. When the limb is examined, a hollow may be felt at the part where the tendon is torn, owing to the retraction of its extremities. The patient, by means of the deep-seated extensors of the ankle, retains the power of extending the foot slightly when there is no resistance except its own weight, but cannot do so with any considerable force, such as is required in walking. Strong adult males are most subject to this accident.

The treatment consists in bending the knee, and extending the ankle so as to relax the gastrocnemius as much as possible, applying lateral compresses at the injured part to keep the ends of the tendon in proper position, and supporting the limb with a bandage. Various contrivances have been employed to maintain the requisite posture. Of these the slipper and calf-piece of Monro I, may be first mentioned.

The calf-piece Dr. Monro compares to the article of dress which jockeys wear to connect their breeches and boots, differing only in so far that it is made to lace on, instead of being buttoned. By means of a strap and buckle, the heel of the slipper can be drawn up to this bandage and secured, so as to effect permanent extension of the ankle.

Petit used a similar apparatus, with this difference, that the strap coming from the heel of the slipper was fastened to a collar surrounding the thigh above the knee, which had the advantage of keeping the knee bent, as well as the foot extended. This seems on the whole to be the best method, and an apparatus sufficiently effective for the purpose may be readily constructed extemporaneously. Compresses of lint should be placed on each side of the tendon at the ruptured part. In the course of three or four weeks the reunion is completed; but it does not become strong enough to resist much force until a considerably longer period has elapsed, during which the patient should be cautious in using the limb, and as a precaution against straining the tendon, wear a high-heeled shoe.

INFLAMMATION AND SLOUGHING OF TENDONS.

The tendons, their fibrous sheathes, and also the fasciæ which lie over them, are very readily deprived of vitality by inflammation. This occurrence most frequently happens in the fingers and palm of the hand in what is called Paronychia or Whitlow. By this term is understood an intense inflammation, generally confined to one finger, but sometimes affecting several, and extending into the palm of the hand, to which also it is occasionally limited. Though the swelling is generally on both sides, the principal seat of disease is almost always confined to the palmar aspect. The pain is agonizing, the tension great, and the redness of the skin affected very bright. The inflammation extends to various depths, and leads to consequences of corresponding importance. Sometimes there is merely a collection of matter found under the thick skin of the part affected. More frequently, in addition to this, there is more or less sloughing of the tendinous structure, and not rarely death of the phalanges.

The causes of paronychia are generally local irritations, but it is probably necessary that their effect should be favored by a state of the system predisposing to derangement. The only effectual treatment consists in making a free incision through the tense and swollen parts. There is reason to believe, that if this were done soon enough it would generally prevent the subsequent suppuration and sloughing; but the opportunity of interposing thus early is seldom afforded, and the incision is usually practiced to evacuate matter. Much mischief is often done by continued poulticing in such cases. Under this influence the matter is long of making its escape by ulcerative absorption, and the opening, when at last formed, is always too small for allowing free exit either to it or the tendinous sloughs. The irritation, therefore, is kept up, especially by the retained sloughs of the tendons, and the destruction of the tissues proceeds. There is no advantage in poulticing previous to incision, and though useful for a day or two afterward

in promoting the separation of the matter and sloughs, it ought not to be persisted in longer than this, as lotions with pressure are much more beneficial. When the tendons slough so extensively so as to render the finger rigid and useless, amputation is the most prudent course; and the patient will generally decide upon it after being made fully acquainted with the reasons for its performance. The distal phalanx often dies, along with a portion of the tendon, but the extremity of the finger ought not to be removed on this account, as it is of great consequence to preserve the secreting organ of the nail, which renders the finger, though shortened, little less useful or seemly than it was before.

[Extensive inflammation and sloughing may be induced in the tendons by the sharp ends of bones pressing them, in cases of compound fracture. The result of the sloughing in such cases will generally be the production of permanent contraction, a circumstance very annoying to the surgeon, and very often not to be avoided even with the utmost care.—R. S. N.]

GANGLION.

By Ganglion is understood a tumor connected with a tendon, composed of a bag containing a glairy fluid, and varying in size from that of a pea to that of a pigeon's egg. There is a difference of opinion as to the nature of ganglions, the question being whether they are entirely new formations, or merely developments of the natural serous structure connected with the tendons. Though arguments might be adduced to support the former of these opinions, it seems on the whole more reasonable to adopt the latter.

The bags vary greatly in thickness, and their contents are no less dissimilar in respect of consistence, being sometimes perfectly watery, but in general gelatinous. The disease occurs most frequently at the wrist and ankle, the extensor tendons being affected in the former, and the flexors in the latter situation. Females are more liable to it than males. It seldom produces inconvenience, except from the deformity which it occasions, but sometimes the patient complains of weakness in the limb. It is generally referred to blows or strains, but there is nothing certainly known as to the causes of its production.

The most simple and effectual mode of treatment is to rupture the bag by pressure applied externally, and force its contents into the surrounding cellular texture. For this purpose some recommend that the ganglion should be struck a smart blow with a book or similar body; but this is a violent and uncertain method, and it is much better to exert a steady pressure on the tumor by means of the two thumbs acting in concert. To promote absorption, a compress and bandage should be applied for some days after the operation. If it should be found impossible to rupture the bag, owing to its strength,

the best plan is to introduce a narrow sharp-edged instrument through the skin, and open the sac, after which its contents may be squeezed into the cellular substance, or discharged externally. The instrument used for this purpose may be a common surgical needle, or a couching-needle, or what answers best of all, the small knife used for cutting the iris in making artificial pupil. To make the effect more certain, a blister ought to be applied immediately after the contents of the bag have been evacuated.

[The blisters recommended by Mr. Syme, may be displaced with the irritating plaster: the tartar emetic ointment is then perfectly useless.—R. S. N.]

Such being the different methods of treatment which will be found most effectual and sufficient for the remedy of the disease in all its forms, and it would be useless to detail the other measures which have been recommended, and are still occasionally employed. Of these continued pressure, affected by means of a piece of money or similar solid compress fastened over the swelling, repeated blistering, inunction of tartrate of antimony ointment, seton, incision, and excision, are the most deserving of notice, but, for the reason mentioned, need not be more particularly considered.

BURSÆ MUCOSÆ.

The *Bursæ Mucosæ*, like other serous structures, are subject to dropsical effusion. The exciting cause is usually some local irritation; and when of an indirect kind, such as cold, its effect in producing the disease seems in general referable to a predisposition of the system, depending on weakness or some peculiarity of constitution. If the membrane is merely distended, and has not suffered any thickening or alteration of structure, blistering, succeeded by pressure, readily induces absorption of the fluid. If the sac is thick and indurated, these means often prove insufficient, and it is found necessary to puncture the swelling so as to let its contents escape, after which, a blister having been applied, the raw surface is dressed with iodine and camphorated murcurial ointment, pressure being effected at the same time, and under this treatment a radical cure is accomplished. Sometimes, along with the fluid, the sac contains a number of loose bodies, occasionally quite similar in all respects to the movable cartilages found in joints, but more frequently of a less distinctly organized structure appearing to consist merely of indurated lymph. They are of a yellow or brownish color, tough consistence, and variable size, from that of a millet-seed to that of a field bean. It is obviously necessary that, in such cases, the puncture must be large enough to let the bodies escape, after which the treatment ought to be conducted on the principles already explained; and if it should be found impos-

sible to subdue the disease by milder measures, the opening into the sac must be dilated, caustic applied to its surface, and obliteration of the cavity by granulation thus induced. When, in such circumstances, the sac is within reach of the knife, it may be cut out at once. The lymph which is effused from the inner surface of the bursa, sometimes becomes organized in the forms of thick bands stretching across the cavity. In such cases, after the means for producing absorption have been tried and failed, and the patient insists upon having the disease removed, there is no choice except between the knife and caustic.

Bursæ, whether in a sound state or one of chronic disease, are subject to acute inflammation in consequence of local irritation, especially that of bruises. The symptoms are severe pain, aggravated by pressure or motion, bright redness of the superjacent skin, and more or less swelling. The inflammation usually terminates either in resolution or effusion of lymph or serum, but sometimes goes on to suppuration. The surrounding cellular substance then also becomes inflamed, and a diffused abscess is the result. Leeches, warm fomentations, and lotions of acetate of lead with opium, are the best means for subduing the inflammatory action, but when matter is formed, a free incision should be made without delay.

[I have so repeatedly spoken of the value of lobelia and gelseminum fomentations and lotions, that I need scarcely again remind the student of their superiority over the opium and lead lotions recommended by Mr. Syme.—R. S. N.]

After the suppuration of a bursa a troublesome sinus remains, and the patient is harassed by frequent exacerbation of the symptoms. Free dilatation is for the most part sufficient in such cases; but should it not prove to be so, the surface of the cavity must be touched with caustic.

The particular bursæ, which most frequently suffer the different diseased conditions that have been described, are those of the flexor tendons of the fingers, and those seated over the olecranon, patella, and ball of the great toe. In the first of these situations, the bursal sheath of the tendons is liable to dropsical effusion and the formation of solid bodies by the induration of lymph; the wrist and palm of the hand become greatly distended, and the patient loses the use of the limb until the disease is remedied. The superficial bursa lying over the olecranon is subject to irritation and acute inflammation from blows, but not unfrequently suffers an accumulation of fluid with thickening of the membrane, and sometimes also with the formation of internal crossing bands from organization of effused lymph. The bursa over the patella is very often distended with fluid, and thickening so as to constitute what is called Ganglion of the Knee. It is met with most

frequently in persons whose occupation leads them often to rest their weight upon the knee. The bursa over the ball of the great toe, when irritated by the pressure of a tight shoe, lays the foundation of that painful and unseemly swelling named Bunion. The parts adjacent become thickened and indurated; the bones of the joint enlarge, and in process of time suffer a sort of subluxation; and the bursa, being thus projected more and more against the shoe, is kept in a state of continual excitement. Dropsical effusion, thickening of the membrane, and suppuration with obstinate sinuses may ensue. It is therefore proper, by the timely application of leeches, or lotions, and the removal of pressure, to subdue the disease in its infancy.

Though the deep-seated bursæ have long been well known to anatomists, and regarded by surgeons as the seat of morbid derangements, those which lie superficially under the integuments are of comparatively late observation, and the swellings, as well as other local affections which proceed from their diseased condition, have been ascribed to entirely new formations. In club-foot, for instance, the bursal sac, which in some measure protects the *malleolus externus* when the weight of the body rests upon it, is not, as has been alleged, a production entirely the result of circumstances, but merely the development of a structure naturally belonging to this part. The superficial bursæ seated over the joints of the fingers and toes, though almost wholly overlooked, deserve great attention in consideration of the effects which attend their injuries and diseases.

In treating this form of ganglion, the means generally employed prove very unsatisfactory in their effect. Blisters and pressure are altogether unavailing. Punctures either heal without producing any improvement, or remain open, so as to occasion obstinate sinuses. Incisions of larger extent, caustics, and setons, have all been carefully employed with very uncertain benefit, and frequently great suffering; indeed, I have known the continued irritation so induced prove fatal. As the treatment of similar derangements in other parts of the body is not attended with such troublesome consequences, the question naturally presents itself, what local peculiarity is concerned in causing the obstinacy of this particular case? The reply suggested by what has fallen within my observation is, that the constriction caused by the annular ligament produces the effect in question, by preventing the portion of bursal sac corresponding to it and the subjacent tendons from undergoing the healing process. Impressed with this conviction, I tried the following experiment, the complete success of which encourages me to hope that the method pursued will be found to afford an effectual remedy for a complaint which has hitherto proved so troublesome.

Janet Preston, aged twenty, was admitted on the 13th of February,

complaining of pain and weakness in her left hand. The wrist and palm of the hand were much swelled, but not discolored, and pressure on these parts caused distinct fluctuation, with the jarring sensation that characterizes effusion into the bursal sheaths. She stated that pain had been first felt about two years before, and that for the last twelve months she had hardly any use of the hand, in consequence of the swelling and weakness attending it.

I made a free incision from the wrist into the palm of the hand, dividing the annular ligament. This gave vent to a quantity of glairy fluid, with many small flat cartilaginous-looking bodies, and exposed to view the flexor tendons, separated and surrounded by thickened bursal membrane. The cavity was filled with dry lint, supported by a bandage moderately compressing the hand and wrist. In the subsequent treatment, care was taken to prevent protrusion of the tendons, by drawing the edges of the wound together, and applying a compress over the seat of the annular ligament. Not the slightest disagreeable symptom followed the operation, and three days after it the patient was able to sew, which she had been prevented from doing for many months previously. In the course of a few weeks the wound healed, and the limb was in every respect perfectly sound.

My colleague in the hospital, Dr. Duncan, repeated this operation with perfect success, and I have performed it in three other cases with the same satisfactory result. It may, therefore, be considered as affording safe, speedy, and effectual relief from a disease rendering the hand affected nearly, if not quite, useless, and, under the influence of remedial means previously in use, nearly, if not quite, incurable.

CHAPTER XVII.

THROAT.

WOUNDS OF THE THROAT.

When self-destruction is attempted by cutting the throat, the wound is generally inflicted transversely near the *os hyoides;* sometimes above, but more frequently below it. There is usually an extensive division of the integuments, which are occasionally the only parts injured; and when the injury penetrates deeply, it almost always extends into the pharynx. Sometimes an opening is made into the larynx, and in a few rare cases the trachea is cut, either alone or together with the esophagus. The great bloodvessels are very seldom

injured, from the force of the incision being spent in dividing the tough substance of the pharynx and air-passage, from the part of the throat which is chosen for the purpose, and from the position in which it is held, while the knife is applied. When they are opened, it is usually by a sharp-pointed knife being thrust directly down upon them.

In considering the treatment of cut-throat, it is necessary to distinguish between: 1. Those cases in which an opening is made above the *rima glottidis;* 2. Those in which it is below the *rima glottidis*, but does not extend to the esophagus; and 3. Those in which the esophagus is wounded.

When the aperture, as usually happens, is above the orifice of the larynx, the dangers to be dreaded, in the first instance, are the entrance of blood into the trachea during respiration, owing to its accumulation in the pharynx, and the escape of food through the wound during deglutition. To obviate the former of these, the cut edges should not be brought together until the bleeding from them has entirely or nearly ceased; and with the same view, the patient should be made to lie on his face or side, so as to favor the exit of fluids from the wound. If the injury of the pharynx is not very extensive, it will hardly be requisite to employ any measures to assist the entrance of the food into the stomach, since the whole of what is attempted to be swallowed will not pass through the breach, and it is not to be desired that the diet should, for some days at least, exceed the limits of extreme moderation. But if the aperture is large, so as to admit one or more fingers, it will be prudent to introduce a tube, such as a flexible catheter, into the esophagus, to serve as a channel for the conveyance of fluid articles of nourishment, until the wound contracts sufficiently to render this unnecessary. The tube may be passed either by the nose or mouth, and also through the wound. When passed by the nose, it may be allowed to remain, and is not liable to displacement; but its introduction is extremely difficult, unless the surgeon takes advantage of the opening into the pharynx to direct the point of the instrument, which otherwise is apt to enter the *rima glottidis*, or engage itself in the lining membrane above the orifice of the esophagus. When the tube, if judged necessary, has been introduced, and the hemorrhage is suppressed, the edges of the wound should be brought together by stitches, while the head is bent forward, and retained in this position by a bandage, or other means. The tube may be safely allowed to remain for several days; but if retained during the whole period of healing, which may extend over many weeks, the irritation produced by its pressure, though perhaps not much felt by the patient, is apt to occasion ulceration of the mucous membrane, with abscess or even exfoliation of the cartilages. After the first week, therefore, nourishment should be afforded either by the power of deglutition still possessed, or

by the temporary introduction of a tube into the esophagus through the mouth.

When there is a wound into the air-passage alone, the tube is not required, unless the breach in the larynx or trachea is so large as to make it desirable to prevent the action of swallowing, in order to guard against displacement of the edges of the wound. If the preternatural aperture is allowed to remain open, the *rima glottidis* has a tendency to contract, and even to close together. It may be possible, when such obliteration or straightening has occurred, to widen the passage sufficiently for the performance of its office, by introducing bougies from below upward;* but such a procedure is extremely difficult and uncertain, and the necessity for having recourse to it should, therefore, be avoided, by carefully promoting early closure of the wound.

In those uncommon cases where the esophagus is cut, the patient must be fed through a tube, unless the opening in the coats of the canal should be so small as to render this unnecessary.

The medical treatment of cut-throat is always extremely important. There is generally great cerebral excitement; the desire for self-destruction frequently continues in operation; and the profuse hemorrhage which sometimes happens exposes the patient to the danger of excessive reaction. It should be recollected also, that the irritation of the wound may occasion swelling of the pharynx, and other deep-seated parts of the throat, adverse to free respiration, and may lead to bronchitis, more or less acute. Every source of bodily or mental excitement must, therefore, be strictly guarded against, while bleeding, counter-irritation, opiates, and antimony, are employed according to circumstances; and whenever it seems, from the efforts of the patient, or the sound of his respiration, that the air does not obtain a sufficiently free entrance, an opening into the trachea must be effected without delay.

[It is a fact to be borne in mind by the student, that Mr. Syme is a very *peculiar* writer. He expresses himself in very clear language, and seems to be constantly trying to condense his thoughts — to concentrate his views into the smallest possible space. This species of composition is the very best for very many persons; for it enables them to retain a vivid recollection of his opinions. We may examine the most voluminous writers on any subject of which Mr. Syme has treated, and though we may find more minutiæ and more irrelevant matter, we shall find that our author has given the gist of all their arguments in a few well-applied words. But again, there are persons who must have minutiæ to understand a subject; and as any one may be suddenly called to treat cut-throat, I deem it proper to enlarge a

* Liston, Med. and Surg. Journal, Vol. xxix, 1828.

little on Mr. Syme. We must not forget that cut-throat is only the termination of a disease; that suicide is dependent upon a morbid state of the brain; and this is usually, if not invariably, conjoined to a morbid state of the stomach, the liver, or some other organ or viscus. So that the physician who attempts to cure the desire of committing suicide by medication, may proceed in accordance with true philosophy. Hence, in the treatment of cut-throat, we must not neglect the general state of the system.

It is to be remembered, that the danger of an attempt to cut the throat is not confined to the separation of the large arteries and veins of the parts, and the severing of the air-tube, but the nerves of the neck—*e. g.*, the phrenic nerve may be divided, and we may get as the result inflammatory congestion of the lungs. The hemorrhage in cut-throat is usually very great, and to arrest this is the first duty of the surgeon. This is to be done by ligatures. In no instance is there needed a more perfect knowledge of the anatomy of the parts. This alone can enable the surgeon to determine the extent of the injury. The incision may be shallow and wide—*i. e.*, it may extend from ear to ear—though this is seldom the case. But whether deep or shallow, the wound will be very gaping, and thus often lead one to think the injury more dangerous than it is. If it should be only a shallow cut, the treatment will be very simple; but if the cut has opened the larynx, the pharynx, or any of the larger bloodvessels, the treatment must be conducted with great circumspection. Mr. Syme has been explicit enough in regard to the treatment.—R. S. N.]

TRACHEOTOMY AND LARYNGOTOMY.

These titles are used to express operations, of which the object is to admit air into the lungs, when the natural passage is obstructed, or to extract foreign bodies that have entered it. The diseases chiefly productive of obstruction are croup, *œdema glottidis*, and ulceration of the larynx. The membranous crust, which is effused in croup, and occasions the diminution of the air-passage, is generally of great extent—stretching from the larynx down the trachea into the bronchial tubes, and is so rarely limited within those bounds below which an aperture can be made, that an operation in this case must be regarded as almost desperate. *Œdema glottidis*, though not a very uncommon affection, has been only recently recognized by pathologists; but through the striking descriptions of M. Bayle and Mr. Lawrence,* together with the frequent notice of it by later writers, is now so well known to the profession, that any account of its symptoms or progress would here be equally unnecessary and out of place. It is sufficient to

* Med. Chirurg. Trans., Vol. vi, 1815.

observe, that in this case, the obstruction is nearly or altogether confined to the *rima glottidis*, the lips of which are thickened by infiltration of serous effusion, so as greatly to impede inspiration, though they still allow of expiration being performed with moderate facility; and that, consequently, there is ample space below for making an opening to admit the air. M. Bayle's judicious observation, however, ought not to be forgotten, that if the operation is delayed until the disease has advanced so far as to occasion repeated threatenings of suffocation, it will hardly prove successful, owing to the excessive secretion of mucus which is induced by the continued irritation and dyspnœa. As soon, therefore, as the nature of the patient's complaint is distinctly ascertained, he ought to be impressed with the propriety and necessity of having the aperture made without loss of time. Ulceration of the larynx does not often impede respiration, though it deprives the patient of his voice, and occasions many other distressing symptoms. But sometimes the breathing in such cases suddenly becomes extremely difficult, and the danger of instant dissolution demands surgical interference, though there may not be the slightest prospect of permanent recovery, or of any advantage more than a few weeks, or even days, longer existence.

The operation may be performed anywhere between the thyroid cartilage and sternum; but convenience and safety limit the choice more narrowly. The space between the thyroid and cricoid cartilages, though covered with little besides the integuments, and so far favorable for the purpose, is objectionable in general on the ground of this proximity to the disease, and always on account of the difficulty which has been experienced in obtaining here a sufficiently large aperture without encroaching on the cartilages of the larynx. In opening the trachea near the sternum, the depth of the tube, which retreats backward as it descends—the presence of the thyroid veins in the line of incision, or even occasionally of the *thyroidea ima* artery—and the transverse portion or isthmus of the thyroid gland, which often, especially in females and children, leaves hardly any accessible space below its inferior margin, are obstacles of no inconsiderable importance. The most convenient situation, when accessible, seems to be immediately below the isthmus of the thyroid. A sufficient portion of the trachea is here often left uncovered, and what more room is required may be gained by turning up or dividing a little of the glandular substance. In cases where there is not room for this mode of proceeding, the opening should be made immediately below the cricoid cartilage, and if it is necessary to cut through the isthmus, the bleeding from it should be allowed to cease before the trachea is opened.

In performing the operation, there is required a scalpel, a couple of hooks, sponge, and tube of a size suited to the age of the patient. It

is well also to be provided with forceps and ligatures, in case of meeting with any arteries unusually large, or irregularly distributed. The patient should be seated on a chair with his head bent back, and rested on the breast of an assistant. An incision, about an inch and a half long, is made as nearly as possible in the mesial line. The space between the sterno-hyoid muscles is recognized by its white appearance, and opened with the knife. The operator then feels for the lower margin of the cricoid cartilage, or the trachea, and cuts down upon its rings, the surface of which having been exposed, serves as a guide for bringing into view what farther space is required for the opening, which should be about half an inch long; and is readily effected by pushing in the knife, while an assistant holds aside the muscles with a hook in each hand. Before wounding the trachea it is proper to wait a little until the arterial bleeding has nearly ceased, or has been suppressed by ligature, should such means be required, which is seldom the case. But as the obstructed respiration, which renders the operation necessary, impedes the venous blood in returning to the heart, the surgeon should not delay opening the trachea on account of dark-colored bleeding. A violent access of coughing follows the introduction of the tube, which is useful in ejecting the accumulated mucus, and any blood that may have entered; but the patient soon becomes accustomed to the usual irritation, and respiration is performed without any uneasiness. The viscid tenacious mucus, which is usually secreted very copiously in cases requiring the operation, is apt to obstruct the tube, whence the necessity of employing one at first of a larger size than would be sufficient merely to admit the air, and of clearing it from time to time by means of a probe wrapped round with lint. The tube must be retained in its place by means of tapes passed through the rings at the mouth, and tied behind the neck. It should be taken out and washed daily, as long as there continues to be occasion for its use; and it will be prudent to cover the orifice with gauze, to prevent the entrance of injurious matters from without.

Foreign bodies are very seldom admitted through the *rima glottidis;* but as the accident, when it does occur, is attended with very distressing and dangerous consequences, great care ought to be taken lest it be overlooked. When it is learned that the patient, while in his ordinary health, in performing the action of deglutition, or, if a child, in playing with some small foreign body in its mouth, was all at once seized with a violent cough, which has continued to recur in paroxysms with variable intervals, although no other symptom of local inflammation or constitutional disturbance can be perceived, the presumption will be strong that this accident has happened; and if the sensation of something moving in the trachea should also be felt, there can remain little room for doubting that a foreign substance has entered the air-

passage. It has occasionally happened that a violent cough proved the means of cure by ejecting the foreign body through the glottis, but no reliance can be placed on this rare chance; and the danger of continued irritation, suffocation from the inordinate secretion of mucus which is excited, or suppuration of the lungs, fully warrants immediate recourse to tracheotomy.

When the operation is performed with this view, it should be conducted in the same way that has been described, with the exception that, instead of a tube being introduced into the trachea, the edges of the opening must be held asunder by a couple of hooks, until the source of irritation is expelled by the forcible stream of air which it occasions.

Should the bit of bone, pea, nut, or whatever may have entered, not appear at the orifice, a pair of curved forceps may be introduced upward to search the larynx, and, if necessary, the cricoid cartilage should be divided to afford more room for this purpose. The forceps may also be directed downward if there is reason to suspect that the foreign body is impacted in one of the bronchi, of which the right one, as being the larger, and more directly in the course of the trachea, will be more likely to contain it.

In cases of urgency, either from the presence of a foreign body, or sudden swelling of the parts concerned, though the proper apparatus for performing tracheotomy cannot be procured, the patient should not be permitted to die of suffocation. A penknife being thrust into the space between the thyroid and cricoid cartilages, as near as possible to the former, and carried down so as to divide the latter, will afford a free aperture, the edges of which may be kept apart by a thin bit of wood, or the expanded branches of a small pair of forceps.

[It is stated by Mr. Nelaton (Clinic Lectures by Atlee, page 55), that of twenty-six cases in which he had practiced tracheotomy twenty-five of the patients died from the operation. Various plans have been recommended for conducting the operation, but none which I prefer to that of Mr. Syme. In Smith's Operative Surgery, we have the statistics of two hundred and forty-five cases, in which one hundred and eighty-eight were unsuccessful, and of twenty-nine operations where the trachea was not diseased there was but one death.—R. S. N.]

REMOVAL OF FOREIGN BODIES FROM THE PHARYNX AND ESOPHAGUS.

The detention of matters, in passing from the mouth toward the stomach, is owing either to their size or their figure. If prevented from descending on account of their bulk merely, they are generally arrested at the commencement of the esophagus, just behind the cricoid cartilage; since, this being the narrowest part of the tube,

if not impacted more or less firmly into its orifice, they are expelled upward by the contractile action of the pharynx, and if fairly introduced into the canal, they have their descent favored by its increasing width. When again the foreign body is small and sharp-pointed, as a pin, needle, or fish-bone, it is usually entangled about the arches of the palate or the neighborhood of the epiglottis, often stretching across the cavity. And should it be impeded partly by figure, partly by bulk, in other words, should it be small enough to pass readily into the esophagus, if not prevented by its rigidity or angular form, the bottom of the pharynx and commencement of the esophagus are the situations where it is generally found.

In the case of a tough digestible mass impacted in the esophagus, the usual method of affording relief is to push it down with a probang, *i. e.* a piece of whalebone with a sponge or ball of ivory fastened to its extremity. The patient's head should be held back, and the whalebone must be slightly curved to assist its taking the proper direction, which is farther promoted by holding the larynx forward. Instead of this method, I prefer extracting the obstructing substance, which may in general be easily effected by means of the curved forceps. If the foreign body is of a hard substance, which might occasion inconvenience if swallowed, and more especially if it possesses an angular form, which might render its more firm lodgement the consequence of force being employed to push it down, the safest course is to induce vomiting, in order to effect its ejectment upward. Where the passage was so completely obstructed as to prevent the swallowing of an emetic for this purpose, a solution of tartrate of antimony has been successfully injected into the veins; but all such means are quite unnecessary, as irritation of the fauces by a feather or the point of a finger is sufficient to induce the most violent expulsive efforts emptying the stomach of its contents, which carry out the foreign body along with them. In removing pins, needles, and such sort of things, the best plan is to ascertain their situation by means of the finger, and then extract them with the curved forceps. Patients frequently apply for assistance days or weeks after swallowing some pointed body, which they believe still remains fixed in the throat. If nothing can be felt with the fingers, it is most probable that the patient's feeling is deceptive, proceeding from imagination alone, or some irritation of the throat, and not dependent upon the actual presence of the foreign body, which may have descended or been ejected. And even should it be actually detained in the esophagus, it would be safer to trust its removal to the ulcerative process, which will soon be excited by its pressure on the tissues concerned, than to persevere in fishing for it with any of the ingenious but ineffective contrivances that have been devised for the purpose.

ESOPHAGOTOMY.

The object of this operation is, to make an opening into the esophagus, or lower part of the pharynx, to extract a foreign body that cannot be removed otherwise; but such a circumstance happens so rarely that there are few instances of a surgeon being called upon in the whole course of his practice to perform the operation.

The patient should be seated or laid reclining, with the head bent backward and to the right side. An incision about two inches and a half in length is then to be made in the middle of the triangular hollow at the upper part of the neck, which is bounded below by the sterno-mastoid and sterno-hyoid muscles. It should extend from the upper margin of the thyroid to a little below the cricoid cartilage. The *platysma myoides* and fascia of the neck having been successively divided, the sheath of the vessels will come into view, and the surgeon then making an assistant press the larynx to the right side, dissects inward to the pharynx, avoiding, if possible, the superior thyroid artery and tying it if cut, until he feels the foreign body through the coats of the bag, or a curved instrument introduced by the mouth so as to distend them. He finally opens the pharynx, and with his finger, or curved forceps, removes the body of which he is in search. After the operation the patient must be nourished by food conveyed either through a tube introduced by the nose, and permanently retained until it ceases to be required, or by one passed from the mouth occasionally.

STRICTURE OF THE ESOPHAGUS.

The esophagus is subject to three different kinds of stricture; one depending on inordinate contraction of the muscular fibers; a second consisting in a simple constriction and thickening of the mucous membrane; and a third caused by degeneration of the coats of the tube, which, becoming the seat of a tumor, render the canal narrow and tortuous.

The first, or spasmodic stricture, is met with chiefly in young or middle-aged persons; particularly those of a nervous habit, or disposed to hysterical complaints, or who have suffered much from mental distress. It is recognized by the difficulty which is experienced in swallowing, and by a disagreeable sensation of constriction in the throat.* The remedy consists in administering antispasmodic medicines, such as the tincture of valerian; correcting any irregularities that may be discovered in the performance of the various secretions;

* Similar symptoms are sometimes produced by a paralytic state of the muscles of deglutition; in which case, if the patient survives the derangement of the nervous system that primarily occasions this dysphagia, food must be supplied through a tube introduced from time to time into the esophagus.

and, if necessary, passing a full-sized bougie into the esophagus, which sometimes at once completely removes the unpleasant feelings of the patient.

[The antispasmodic tincture in such general use among Eclectic practitioners will be found an invaluable agent.—R. S. N.]

The second, or simple organic stricture, as it may be named, occurs chiefly at the commencement of the esophagus, opposite the cricoid cartilage; and for the most part in people who have somewhat passed the middle period of life. The contracted part is usually of small extent, seeming as if it were caused by drawing a thread round the tube, and exists in various degrees of width, from that of a small quill upward. The circumstances which occasion this morbid state have not been well ascertained. When irritating or escharotic fluids, such as the diluted mineral acids—or strong alkaline solutions, are introduced into the esophagus, the usual consequence, in case the patient survives, is thickening and contraction of its coats. And it may reasonably be imagined that the change in question is produced by the same cause operating on a smaller scale; but the patient can hardly ever refer the origin of his complaint to any particular irritation from stimulating food or other source.

The symptoms of this disease generally manifest themselves very insidiously. The swallowing of large morsels becomes difficult and painful; the food is more carefully masticated than before; and as the contraction increases, while none but very small portions of solid matter can be got down, even they in passing the stricture occasion pain, which is felt shooting into the back of the neck and shoulders. From the frequent recurrence of this distressing sensation, and the dread of exciting it, the patient's countenance acquires a very characteristic expression of anxiety; which, together with the emaciation that results from deficient supply of nourishment, is almost sufficient to betray the nature of the case to an experienced practitioner. It may be added, that the voice is peculiar; sounding as if the person spoke with a foreign body in his throat; that there is no swelling to be perceived by external examination; and that though there is frequent spitting of saliva, no blood is discharged. But the only method of positively ascertaining the existence, seat, and degree of stricture, is to introduce a succession of bougies, gradually decreased in size from that which ought to enter the esophagus readily, if it were sound, down to that which the constriction is capable of admitting.

The treatment of this kind of stricture has been conducted on two principles: one of them being to apply caustic, with the view of destroying the thickened or contracted part of the membrane; and the other to produce a gradual dilatation of it by means of bougies. The former of these methods, though supported by the strong recommend-

ation of Sir E. Home and other authorities, labors under the objection of being painful, difficult, and attended with great danger of injury to the neighboring parts; while the latter is not only in a great measure free from these defects, but proves much more speedy in its operation. The bougies may be constructed either of elastic gum or of steel. If of the second kind, they ought to be a little curved, and have their extremity made slightly bulbous, as this enables the operator to feel more distinctly when it has passed the stricture. The effect of bougies in removing strictures of mucous canals is not, as was formerly supposed, merely mechanical. This no doubt is the first effect, but another very important one follows, which is the action of absorption, induced by the pressure of the instrument. The organizable matter effused into the coats of the gullet, causing their contraction and thickening, is thus gradually removed. But if the bougies be passed with undue force, or too frequently, or be retained too long, the effect, instead of being absorption, is apt to be effusion, the consequence of which is an aggravation of the disease. The bougies, therefore, should be immediately withdrawn after being passed through the stricture; and the operation ought not to be repeated until the irritation of the previous one has entirely subsided, which usually requires an interval of two or three days. Great care must be taken to avoid making a false passage for the instrument, which, if improperly directed, or urged with undue force, may be readily pushed into the posterior mediastinum, or elsewhere through the coats of the canal. In this case, the action of deglutition tends to propel foreign matters into the new aperture, instead of the strictured esophagus, and speedy death is the almost inevitable consequence.

The third kind of stricture, or that which depends on morbid degeneration of the esophagus, causing a tumor in its coats, and which may be named the malignant or carcinomatous stricture, is met with chiefly in persons of advanced age. It usually occurs at the ordinary situation of other strictures, that is, behind the cricoid cartilage; but sometimes takes place lower down, near the cardiac extremity of the tube. The symptoms are those of simple stricture, together with those attendant on morbid formations of the kind in question. The patient feels lancinating pain, more or less constant and severe, in the part affected. A tumor can often be perceived by external examination of the throat. There is occasionally a bloody, foul discharge; and the patient's countenance acquires that greenish-yellow complexion which characterizes a system laboring under malignant disease. As it is evidently impossible to effect excision of the tumor, the disease must be regarded as truly incurable; and any attempts with caustic or the simple bougie, instituted either from misapprehension of the nature of the case, or an ill-grounded

expectation of promoting absorption of the morbid structure, must prove injurious by increasing the patient's sufferings, and hastening the progress of the disease. This kind of stricture, as well as the one depending on simple contraction, is simulated by malignant disease of the stomach, which, therefore, requires to be carefully discriminated. This is best done by passing a moderate sized bougie.

BRONCHOCELE.

By Bronchocele is understood a tumor depending on enlargement of the thyroid gland. The morbid growth is usually most akin to the simple vascular sarcoma; but sometimes consists, partly or entirely, of cysts, and has also been found to contain calcareous masses bearing some resemblance to bone. The swelling varies in size, from the slightest perceptible degree of fullness, to a magnitude that occupies nearly the whole space between the chin and sternum; and extends forward as well as laterally in large round irregular projections. Its consistence is soft and elastic, and a section of it exhibits a yellowish granular structure. The vessels are generally very much enlarged, in proportion to the size of the tumor, whence incisions into its substance, during life, are attended with profuse hemorrhage. Sometimes the whole gland is equally enlarged, but it generally exceeds on one side; and occasionally the swelling is entirely limited to the right or left lobe, particularly the latter. In this case the surgeon must be upon his guard against supposing that the disease is an aneurism of the carotid artery, or an independent tumor admitting of excision, which opinion he may be led to adopt by the seeming mobility of the growth, owing to the flexibility of its substance. Bronchocele is observed to abound chiefly in certain districts, which are mostly of a mountainous kind, where it is often associated with mental imbecility. The frequency of bronchocele in such regions has not yet been satisfactorily explained. It has been attributed to the use of snow-water, the violent exertions required by the inhabitants in climbing precipitous paths, which, it has been alleged, must expose them to frequent venous congestion, and to the prevalence of a damp atmosphere, in the misty valleys and ravines, which has been supposed likely to promote the growth of glandular swellings. In the countries where the disease is not endemic, it is almost entirely confined to females, generally commencing about middle age, and affecting chiefly the laboring classes.

The symptoms of bronchocele are swelling in the situation of the thyroid gland, which follows the motions of the larynx during deglutition, and cannot be moved without a corresponding displacement of it. There is seldom much obstruction either of breathing or swallowing, owing to the resistance which is made by the cartilaginous structure of the air-passages, and the protection from pressure which

the trachea affords to the esophagus. Headache, however, not unfrequently results from the obstruction which the blood meets with in returning from the head through the jugular veins; and the patient occasionally complains of more or less uneasiness in the tumor itself. But, for the most part, the principal inconvenience sustained depends simply upon the bulk and weight of the enlargement; and after attaining a certain size it usually ceases to increase.

The deep situation, muscular coverings, firm connections, and large bloodvessels of bronchocele forbid excision; and the attempts which have been made with this view afford a sufficient warning against their repetition, by the fatal issue which has almost invariably, and often immediately, followed them. The ligature of the superior thyroid arteries, which, though previously proposed by others, was first executed by Sir W. Blizard, does not seem deserving of adoption. The operation has been sometimes found extremely difficult, owing to the displacement and overlapping of the vessels by the tumor; it has even proved fatal, by giving rise to extensive ulceration; it has rarely or never effected an entire removal of the swelling; and has generally induced only a very partial absorption. The plan of passing a seton through the tumor, in order to excite suppuration, and a consequent diminution of bulk, which was brought into notice by Quadri, of Naples (1818), but had been proposed and even practiced previously, is easily executed, and seldom leads to any serious consequences. Fatal cases, however, have been observed by Chelius and others, in consequence of the center of the tumor entering into a profuse suppuration, while the rigidity of the parietes prevented their contraction, so as to diminish the size of the cavity; and the good effects of the practice have been at best but of partial extent. Except, therefore, in cases where circumstances render it very desirable to reduce the size of the swelling, there seems to be little encouragement to employ the seton. If it is thought proper to do so, a skein of silk or cotton should be conveyed through the anterior part of the tumor where there is no danger of wounding the large arteries; compresses, if necessary, are then to be applied over the orifices, and fomentations with poultices must be employed afterward, if required by the occurrence of inflammatory consequences. When suppuration commences, the seton may be changed, and when the tumor ceases to diminish, it may be withdrawn altogether. Incisions into the tumor, and the application of caustic to it, which act on the same principle as the seton, are less eligible means, inasmuch as they are more severe in their administration, and not so efficient. Mr. Liston has employed the ligature with success, previously dissecting the integuments of the projecting part of the tumor, and then transfixing its base; and I once adopted this method in the case of a lady who had a lobe of the thyroid enlarged

into a round tumor with such a narrow neck as to appear altogether insulated.

With the exception of those cases where some energetic interference is peremptorily required, which are fortunately rare, the best treatment for bronchocele is to blister the surface, and apply ointments, containing iodine alone, or in combination with mercury. Ever since Dr. Coindet, of Geneva, introduced the use of this medicine to promote absorption (1820), it has been very generally employed both internally and externally for this purpose. Along with such external applications the tincture of iodine or the hydriodate of potass may also be given internally. The internal use of burnt sponge, which was formerly considered the grand specific for bronchocele, has gone nearly into disuse since iodine came to be regarded as its active principle in exciting the action of the absorbents. Under this treatment, the tumor generally suffers some diminution; and occasionally, but unfortunately very rarely, is reduced to the natural size. When the case ceases to improve, or is obstinate from the commencement, the patient should be dissuaded from subjecting himself to any more severe expedients unless his existence should be threatened or rendered seriously uncomfortable by the presence of the swelling. The headache, which occasionally proves a distressing attendant of the disease, is sometimes much alleviated by the application of a few leeches to the temples from time to time.

When the enlargement is found to depend on the presence of a cyst, it should be punctured, and have a seton passed through its sides, or be injected with diluted tincture of iodine, as in the case of hydrocele.

[Bronchocele is often endemic, or confined to certain localities, for the explanation of which various theories have been advanced. These have, however, been of an unsatisfactory character, and until more is known of the inducing causes, all we can do is to collect such facts, and endeavor from them to arrive at some positive conclusions.

In the treatment of Bronchocele, I have perhaps been as successful as most surgeons, and beg to offer, for the consideration of the profession, the Eclectic plan of treatment. I commence putting on over the gland the common irritating plaster, which is kept on till free suppuration is produced. When it becomes much inflamed and painful, then put on a slippery-elm poultice until the inflammation has been reduced, when it may be dressed with mild zinc, or Mayer's Ointment. When it shows a disposition to heal or dry up, I then cause the patient to turn his head to the side on which the gland is most enlarged, and while in that position, I pass adhesive straps over it, and around the throat toward the shoulder. When the patient turns his head straight, the proper pressure is then excited on the gland, and a cure is generally effected.—R. S. N.]

CHAPTER XVIII.

THORAX.

WOUNDS OF THE THORAX.

Superficial wounds of the thorax, which do not penetrate the cavity, require merely ordinary treatment. Muscular bruises occur very frequently, and often occasion so much uneasiness in respiration as to simulate inflammation, and induce the practitioner to employ copious and repeated depletion, which can do no good, and may prove very hurtful by inducing the symptoms of excessive reaction. The state of the pulse in such cases, if attended to, will prevent this injudicious practice, instead of which the injured muscles should be restrained from motion by encircling the chest with a broad bandage.

Penetrating wounds are attended with various important effects, the mode of production and treatment of which should be thoroughly familiar to the practitioner, who, on such occasions, is called upon to act, without delay, on the knowledge he happens to possess.

If air be admitted through the aperture, as it must almost necessarily be to more or less extent, the lung of the side affected, unless adherent to the parietes of the cavity, inevitably contracts itself, owing to the elasticity of the pulmonary tissue, which is thus placed in equilibrio as to the pressure of the atmosphere. If only a small quantity of air has been allowed to enter before the wound is closed, the contraction of the lung will be proportionally inconsiderable. But if the wound remains open until the contractile tendency of the lung exerts its full effect, respiration, so far as that half of the pulmonary apparatus is concerned, will be completely suspended. The patient then feels great oppression in the chest; his cheeks become purple, owing to the imperfect oxygenation of the blood; his extremities are cold; his pulse frequent, small, and irregular; and, if proper measures are not employed for his relief, death may ensue from congestion of the sound lung, or from the inflammation which results from this state. In cases of recovery, the wound of the thoracic parietes heals, and then the air which had been admitted into the cavity of the pleura is absorbed, so that the lung is forced to expand, and performs its function as before the injury.

In conducting the treatment of a simple penetrating wound, it should be recollected that the danger consequent upon the injury proceeds

from inflammation of the pleura, caused by the wound, or by oppression of the sound lung. The practice thus suggested consists in protecting the patient from all sources of bodily and mental agitation, and diminishing the quantity of blood in the system, so as to lighten the labor of the weakened organ. With these views, the thorax should be surrounded with a broad bandage; the horizontal posture, and strict antiphlogistic regimen, should be enjoined; and blood should be taken from the arm in quantity proportioned to the strength of the patient, but so largely as to relieve, if not remove altogether, the sense of oppression which is felt about the breast; after which antimonials and opiates must be diligently employed to moderate the force of the circulation, supersede the necessity of farther depletion, and lessen the risk of excessive reaction from what has been already employed.

[The reader will bear in mind, that no repair and union of parts can occur unless there is some inflammation; hence, no bleedings are necessary.—R. S. N.]

When a wound of the thorax not only penetrates the cavity, but also extends into the substance of the lung, the consequences are still more important, since, in addition to those that occur in the former case, there are the dangers which attend hemorrhage into the cavity of the pleura, and into the bronchial tubes of the sound lung. The injury is generally recognized by bloody expectoration, and a discharge of blood or bloody froth from the wound. But it must be recollected that, though neither of these indications be observable, a wound of the lung may exist, and even be productive of a copious bleeding into the cavity of the chest.

The same objects of treatment exist here as in the case of a simple penetrating wound, but should lead to a practice still more decided and careful, as the danger must always be regarded as more serious. The circumstance of internal hemorrhage demands additional consideration, and has afforded fruitful subject of discussion in respect to the mode of preventing and remedying it, and also as to the diagnostic marks of its presence. Some recommend the external wound to be closed immediately, in order to retain the blood, and limit the extent of its effusion by effecting pressure on the breach of the lung. It is true that the fluid thus accumulated may be removed by subsequent absorption, without causing any trouble to the patient, but experience has ascertained that, instead of this salutary process, the irritation of its presence is more apt to excite a fatal inflammation, and there seems little inducement to incur this risk when the alleged advantage of the practice is fairly weighed. When the lung is wounded, it must suffer a complete contraction, since the air, though not allowed to enter by the external wound in sufficient quantity to occupy the space required for its entire collapse, will find a ready entrance from the branches of

the trachea which are wounded; and the external surface of the lung being thus maintained permanently in equilibrio with the internal one as to the pressure of the atmosphere, the elasticity of the organ will meet with no obstacle to the exercise of its contractile tendency. The cavity for the reception of the blood must, therefore, be very capacious; and when the yielding nature of its parietes toward the diaphragm and the other side of the chest is taken into account, it seems difficult to conceive the possibility of making effectual pressure on the cut surface of the lung by retaining the fluid.

For these reasons, it appears to be the more prudent practice to afford free exit to the blood, by keeping the original wound open, or making a new one in a more convenient situation, while by bleeding from the arm, and the other means that promote the cessation of hemorrhage by inducing coagulation in the wounded vessels, the farther flow of blood from the lung is restrained.

[If coagulation is desirable, bleeding is certainly not promotive of such an end. It should be borne in mind, that in a great majority of wounds there has already been a copious hemorrhage; and to bleed the patient further is certainly uncalled for, even if Mr. Syme's pathology be admitted.—R. S. N.]

If the wound of the parietes is small, or near the upper part of the chest, internal hemorrhage may take place to a great extent without any external indication of its existence, especially if, as sometimes, but very rarely, happens, it should proceed from one of the intercostal arteries. Various symptoms of blood accumulating in the chest have been observed, and carefully described as affording the means of recognizing it. Of these, the most important are coldness of the extremities; clammy perspiration of the face; a purple color of the cheek on the side affected; inability of lying on the sound side of the body, which is probably the cause of the preceding symptoms; extreme oppression of breathing; a small fluttering pulse; suppression of urine; and a want of the usual resonance when the affected side of the chest is subjected to percussion. As all these signs, and also those more questionable ones which have not been thought deserving of mention, whether taken together or separately, must be regarded as insufficient to yield positive proof on the subject, it is prudent in doubtful cases to open the wound, in order to ascertain the truth.

Many elaborate directions are given by the old writers for the suppression of hemorrhage from the wound of an intercostal artery—an injury very seldom met with. If the opening were freely dilated, a compress of lint applied under the edge of the rib, would probably prove sufficient, and if it should not, there could be no harm in rendering its effect more certain by including it in a ligature drawn round the rib under the edge of which the vessel lies.

In consequence of wounds and fractures of the thorax, air is frequently injected into the cellular substance under the integuments of the chest, constituting what is called Emphysema, and in other cases it is accumulated within the pleura so as to distend the membrane, and compress the sound lung with distressing or even fatal effect. It is highly important to be acquainted with the circumstances on which these events depend, and the mode of preventing or remedying them.

For the production of emphysema, it is requisite that there should be an aperture in the *pleura costalis*, to admit the air into the cellular substance; and the power which forces it to enter is always the contraction of the parietes of the thorax—but there are two sources from which the air thus impelled may be derived. One of these is a simple penetrating wound of the thoracic parietes, so narrow, or so shaped and situated, as to allow the air to enter the chest during inspiration, but oppose its free exit during expiration, permitting it to pass no further than through the pleura. The second is a wound of the lungs and *pleura costalis*, existing without any outlet through the parietes of the chest, which may be caused by the spicular extremity of a fractured rib, or may result from the healing of the skin, while the breach in the lung and pleura remains open, in a case where both the parietes and lung have been wounded. When the air enters the cellular substance, it diffuses itself more or less extensively, and occasions a flat undefined swelling of the integuments, which is recognized by a crepitating or crackling sensation, that is felt on pressing it, and by the quick disappearance of dimples thus produced in its surface. The integuments of the whole body, except where the subjacent connections of the skin are very firm, as the palms of the hands and soles of the feet may be distended in this way—but universal emphysema is an extremely rare occurrence—its extent being usually limited to the side of the chest which has been injured. The treatment is simple and obvious, consisting in the application of a compress over the wounded part, to oppose the farther issue of air from the cavity of the pleura, and if necessary, in making punctures at different places to discharge what is contained in the cellular substance—but this should not be done unless the swelling is so great as to be productive of much inconvenience, since, if left to itself, it will soon be removed by absorption.

Accumulation and confinement of air in the cavity of the pleura, or *pneumo-thorax*, as it is called, though less obvious to sight than emphysema, is a more distressing and dangerous occurrence. It gradually distends the membrane in which it is inclosed—presses upon the pericardium and sound lung—and at length occupies so much of the thoracic cavity, as not to leave sufficient space for the lung of the sound side to perform its function. In this case, as has been already remarked, the air may enter either by an external wound, which is of such a

valvular kind as to allow its getting in when the chest is expanded during inspiration, but prevents its exit when the parietes of the cavity are drawn together during expiration; or it may pass into the pleura by a wound of the lung which exists without an external one—the wound of the lung itself having necessarily a valvular effect, as the soft substance of the pulmonary tissue, though opposing no resistance to the escape of air from the small bronchial tubes, will prevent its return into them by collapsing round their cut orifices, when subjected to pressure during expiration. In either of the circumstances above mentioned, every inspiration will tend to enlarge the quantity of air contained in the pleura, while the succeeding expiration has little or no effect in reducing it. The patient consequently feels great and increasing difficulty of breathing. The inspirations are short, almost instantaneous, and end with a sort of catch. The expirations are laborious and ineffectual; and there is a distressing sensation of tightness across the breast; the pulse is small and irregular; the countenance is livid; and unless relief be afforded, death ensues. The symptoms of this condition bear considerable resemblance to those of hemorrhage into the pleura—but the resonance of the chest, which is absent in the latter case, and more than usually distinct in pnuemo-thorax, distinguishes the one from the other.

If emphysema is present along with pneumo-thorax, scarifications should be made for the discharge of the air contained in the cellular substance, which also afford exit to that accumulated in the chest; but if this proves insufficient, or if there is not any emphysema, an opening should be made without delay through the parietes of the thorax. *Paracentesis thoracis*, for this purpose, was first proposed by Mr. Hewson.*

PARACENTESIS THORACIS.

Paracentesis, or puncture of the thorax, is performed to evacuate air, blood, pus, or serum accumulated to an injurious extent within the cavity of the pleura. It might appear at first sight that almost any part of the parietes could be chosen for this purpose, but the following considerations limit the proper bounds of the operation to a more narrow space. An opening higher up than the fifth or sixth rib would not afford a convenient outlet for the fluid which requires to be discharged, and it could not be made lower than the ninth or tenth without incurring the danger of injuring the diaphragm. The intercostal spaces, not thus interdicted, are thickly covered with muscles for a third part of their extent at least, from both the sternal and vertebral extremities; and at these parts the intercostal arteries are more exposed to danger than

* Med. Obs. and Inquires, Vol. iii, 1767.

in that which lies between the angles and the cartilages of the ribs. The principal vessel of each intercostal space runs along the lower edge of the superior rib, overlapped and protected by the sharp descending ridge of its external margin—but a branch of the artery proceeds along the upper border of the lower rib—and the safest place, consequently, for cutting through the parietes is equidistant between the two ribs that circumscribe the space selected for the operation. It appears, on the whole, therefore, that the best situation for operating is between the fifth and eighth ribs on the right side, and the sixth and ninth on the left, where the presence of the pericardium renders it prudent to cut lower, at an equal distance from the sternum and spine, and in the middle of the space between the two ribs.

The patient should be laid on a sofa, or brought to the edge of his bed, and be made to bend his body so as to render the affected side of the chest as convex as possible. The surgeon makes a cut, between one and two inches long, through the integuments resting on the lower rib, and an assistant having then pulled the parts upward so as to make the wound correspond with the middle of the intercostal space, the muscles and pleura are to be successively divided with a scalpel guided by the fore-finger of the left hand, which is a safer method than thrusting in a trocar. After the fluid has been evacuated, the aperture must either be closed, or kept open by means of a tube, accordingly as circumstances may require.

[Before this operation is performed, we should take the proper steps to prevent sinking as a consequence. This is to be effected by tonics, if they have time to act, and if not, then by stimulants and tonics conjointly.—R. S. N.]

DISEASES OF THE MAMMA.

The Mamma is liable to so many disease, that it is necessary to make a classification of them. They may be divided into: 1. Those in which there is merely derangement of its nutritive or sensitive action, causing simple enlargement, induration, and pain. 2. Those in which there is a collection of purulent fluid. 3. Those in which there is a morbid growth limited to the part in which it originates; and 4. Those in which the growth is of a malignant kind, that is, tends to spread, ulcerate, or fungate, and affect the patient's constitution.

The first of these divisions comprehends the painful indurations which affect the breast at the time of puberty and in the early months of pregnancy—also a more chronic condition of the same kind, not unfrequently met with in middle-aged women—and lastly, a painful state which is named the Irritable Breast. The second division includes the Acute or Milk Abscess, as it is usually called, and the Chronic Abscess. The third division embraces Vascular or Simple

Sarcomatous, Fibrous, and Cystic Tumors; and the fourth, those of the Carcinomatous, and Medullary or Cerebriform kinds.

In both sexes, about the time of puberty, the breasts frequently become enlarged, hard, and painful, but soon return to their ordinary condition, and seldom require any treatment farther than the application of fomentations or some soothing lotion. The state of excitement, which attends the development of the sexual organs, is apt to occasion great alarm, from being supposed to denote malignant action of the parts, and there is reason to fear, has even led to excision of the gland. The same observations will apply to the painful and slightly swollen state of the breast which is observed at the commencement of pregnancy.

[I have elsewhere (in my work on Diseases of the Breast, now in course of publication) treated fully of the nature of the sympathy between the mamma and the genitals. This sympathy is of very great importance, and should be carefully studied by every surgeon. As Mr. Syme suggests, it is almost certain that very grave errors have been committed in consequence of not understanding the nature of that sympathy.—R. S. N.]

Induration of the breast, at a more advanced period of life, is a very common effect either of slight direct irritations, as blows or bruises, or of the indirect irritation which proceeds from suppression or derangement of the natural secretions. Women, about the middle period of life, particularly those who are not married, or who have no children, are most liable to this complaint. It generally affects both breasts, but is sometimes limited to a lobe of one. The induration is not well defined. It does not feel very hard or heavy, and, if attended with pain, the patient describes her uneasiness as a sort of burning sensation, which is not always equally severe, but varies much in this respect, according to the state of her mind and body. The patient's appearance and time of life, the history of the tumor, its consistence, and the readiness with which it generally yields to proper treatment, distinguish this from more serious affections of the mamma. When the breast is particularly painful, leeches and warm fomentations may be used with advantage, or a litharge plaster may be applied over it; but local treatment is to be regarded as of secondary importance; since the disease almost always depends upon the state of the general health, and is to be remedied by its improvement. With this view any derangement of the intestinal or menstrual secretions, which is ascertained to exist, must be, if possible, rectified without delay; and then a gentle course of alterative medicine, especially the saline laxatives, used daily, with due attention to the mental condition of the patient, ought to be carefully employed.

The mamma sometimes becomes the seat of uneasy sensations so

distressing and unceasing as fully to warrant the appropriation of a particular title to express them. The irritable breast is generally met with in middle-aged women, of nervous disposition, who have been much exposed to grief, disappointment, or anxiety. It is recognized by the extreme suffering of the patient, who represents the pain as equally intolerable and indescribable. It never leaves her entirely, but has remissions of partial relief, and exacerbations, in which the agony is extreme. These paroxysms are induced by everything that directly or indirectly occasions excitement. Pressure, as that applied in examining the breast, agitation of mind, and derangement of the secretions, are the most certain means of producing this effect. When the patient submits to an examination of the painful part, it is felt to be a little fuller and denser than usual; sometimes engaging the whole gland, and at others being confined to a single lobe, or a still smaller portion. In cases where the symptoms are mild, great relief, or even a complete cure, is sometimes obtained from fomentations, and other soothing local applications, together with the internal medicines requisite for restoring to a healthy state the secretions that may be deranged. But these means often prove quite unavailing, and the patient suffers such distress, that she insists upon the seat of the pain being removed; and this wish must sometimes be complied with in order to allay the apprehension of malignant disease, which greatly aggravates the complaint by agitating the mind. The gland, when cut into, displays a somewhat whiter and denser structure than usual, and frequently also cysts of various size containing a limpid fluid. The operation is usually followed by an interval of complete relief, and sometimes by a permanent cure; but the cicatrix, or neighboring parts, are apt to become the seat of sensation similar to, though seldom so severe, as those previously experienced, and for which the same soothing means ought to be employed.

[There is no doubt but some very serious mistakes have been made in treating this disease. It is essentially a disease of sympathy, being entirely nervous; and wherever it exists, we shall find a corresponding irritable condition of the uterus. The treatment should, therefore, be directed to that part (see Bennet on the Uterus). Some years ago, a lady came to me to have her breasts excised, but clearly perceiving the nature of the case, I refused to excise them. Another surgeon was found, who, not understanding the case, removed her breasts, but she suffered as much after as before the operation. When she called on me a year afterward, I pointed out the neuralgic character of the disease; and after treating her with the speculum and caustics for a few weeks, she was completely relieved. In treating such a case, we should freely administer gelsemin and macrotin, along with an occasional dose of veratrin.—R. S. N.]

The milk abscess is a collection of purulent matter formed in the mamma during lactation. If, while the gland is in this active state, constitutional disturbance should be excited by exposure to cold, errors of diet, or any other circumstances, the fever thus induced is very apt to be attended with, or followed by, inflammation of the previously excited organ. The patient's first intimation of indisposition is a rigor, accompanied with pain of the back and headache, which is soon succeeded by heat of skin, quickness of pulse, loading of the tongue, and flushing of the face. At the same time the breast becomes red, tense, and painful, which symptoms increase, while the short but smart fever, or weed, as it is vulgarly named, subsides in the course of twenty-four or forty-eight hours. In a few days, if the inflammation does not terminate in resolution, the fluctuation of fluid may be felt in the mamma; and if the process is allowed to proceed naturally, the matter is at last evacuated by ulceration or sloughing of the integuments.

In treating this affection, it is usual to begin with the application of leeches; but it does not appear that much advantage is thus obtained. Warm fomentations externally, and saline purgatives, to promote the intestinal secretions, with gentle antimonial draughts, to produce a similar effect on the skin, ought to be employed in the first instance, as being the most efficient means for inducing resolution of the inflammatory action.

[The asclepin, in small doses, acts like a charm in this case.—R. S. N.]

If it goes on to suppuration, poultices should be substituted for the fomentations, and the patient must observe a restricted regimen to moderate the flow of blood toward the breast. The cavity of the abscess generally heals sooner when evacuation of the matter is not hastened by using the knife, before the suppuration is completed, and the thin superjacent integuments project or *point*. If, when the process is thus far advanced, the patient suffers much pain from the confinement of the matter, an incision should be made, since it will not then delay the subsequent process of cure, and may even accelerate it by preventing extensive ulceration, sloughing, or the formation of sinuses. After the matter has been discharged, a poultice is useful for a few days, and then simple dressing, succeeded by some gently stimulating lotion, may be used to dress the sore until it is completely healed.

The chronic abscess forms insidiously without any observable symptoms of inflammation. It occurs at all periods of life, but is met with most frequently in middle-aged women who are not married, or have no children. The size of the swelling is generally about that of an egg, its contents are usually thin, like whey or oil, and it is for the most part deeply seated. The integuments being free from redness

and tension, while the substance of the gland, except in the neighborhood of the part affected, where it is condensed and thickened, retains its natural consistence, the abscess is very apt to be mistaken for a solid tumor, and this error is in some cases confirmed by swelling of the axillary glands, which, taking place in consequence of the irritation caused by the collection of fluid in the mamma, or perhaps altogether independently of it, is regarded as evidence of malignant action propagated along the absorbents. The equality of the surface of the tumor when examined through the parts lying over it, the absence of pain when this is done, and the feeling of fluctuation that may then be more or less distinctly perceived, afford in general sufficient grounds for an accurate diagnosis; and should there remain any doubt as to the nature of the swelling, it may be readily resolved by making a puncture, which will evacuate the fluid if there is any, and will do no harm if there is not, since in that case excision ought to be performed without delay. A free opening should be afforded to the matter, and the sides of the incision must be carefully kept separate to prevent their union, which is very apt to happen owing to the thickness of the parts. This operation is sometimes followed by considerable inflammation and constitutional disturbance, during the continuance of which, fomentations, with poultices and suitable remedies of a general kind, are to be employed according to circumstances. If necessary, more free dilatation, and stimulating washes, with an alterative course of medicine and diet to improve the patient's health, may afterward be had recourse to.

As a consequence both of this and the former kind of abscess, there frequently remain sinuses of great extent, seated very deep between the mamma and pectoral muscle, and running through the substance of the gland in various directions. A copious thin sero-purulent discharge issues from the orifices, which are generally numerous, and the whole breast becomes hard, and immovably attached to the ribs through induration and adhesion of the muscular, cellular, glandular, and cutaneous tissues. The appearances presented by the disease are then so alarming, and indeed hopeless, to one not acquainted with the nature of the case, that excision of the affected parts might readily be thought of, and, there is reason to believe, has even been executed. Mr. Hey, of Leeds, proposed, as a substitute for removal, the free incision of all the sinuses, so as to lay them fairly open, however numerous and deep, even though it should be necessary in doing this to divide, or even insulate, portions of the gland. This severe practice, though still employed by some, is not necessary, since experience has shown, that merely enlarging moderately with the knife the orifices of the more dependent sinuses is sufficient for the purpose. During the process of cure, the affected breast should occasionally be rubbed with

some gentle stimulating liniment. A sulphate of zinc lotion, either simple or combined with spirits, as recommended by Mr. Hey,* will be the best application to the surfaces of the wounds; and it is useful to throw injections of the same into the sinuses that have not been laid entirely open.

VASCULAR SARCOMA.

Vascular sarcoma, or hypertrophy of the mamma, seldom occurs to such an extent as to constitute what may be regarded a diseased enlargement, and fullness of the breast, is generally owing much more to redundance of the adipose tissue than the size of the gland. Occasionally, however, the mamma does suffer a morbid increase, and may attain such dimensions as to become an insufferable load to the patient. Cases are recorded in which tumors of this kind were found, after removal, to weigh many pounds. Iodine and pressure may perhaps have some effect in repressing such growths, or even in diminishing them, especially if conjoined with efficient means for improving the general health, and restoring any secretions that are found to be suppressed; but if the tumor continues to enlarge, and is the cause of intolerable oppression to the patient, there can be no doubt as to the propriety of removing it.

[It is better to excise and remove by caustics the entire morbid structure, than to engorge the system with large quantities of iodine, thus laying the foundation for the most serious complaints. If seen in its earliest stage, it would be well to put the patient on a strong alterative course, for which there is nothing better than phytolacin, irisin, podophyllin, in combination or alone. But if not seen until it has progressed somewhat, the entire morbid structure had better be removed at once.—R. S. N.]

FIBROUS SARCOMA.†

This tumor is not like the one last mentioned, merely an enlargement of the mammary substance, but a distinct new formation. It possesses a fibrous structure of variable density, from that of cartilage to the consistence of a salivary gland; its color is generally white, or grayish-yellow; its figure is usually round, or oval, with an irregularly nodulated surface of a glistening appearance. When small, it is extremely movable, and seems, upon examination through the integu-

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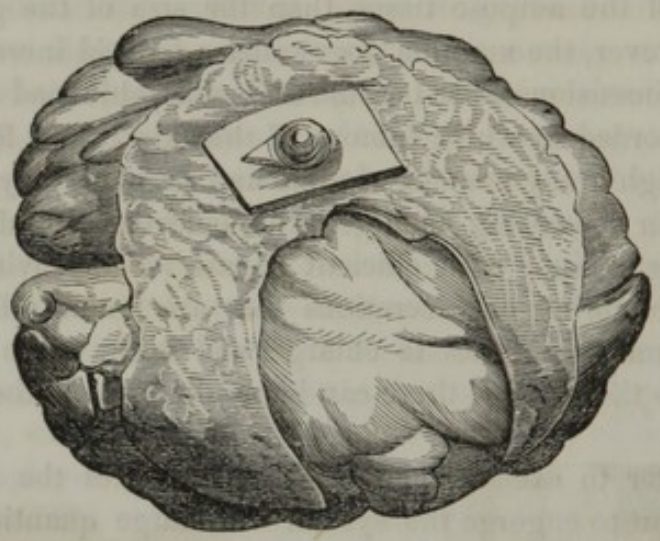
* ℞ Aquæ, - - unc. xxx;
Sp. Rosmar., - unc. ii;
Sp. Lavan. comp., - dr. ii;
Zinci Sulphat., - dr. j. M. ft. lotio;
Hey's Surgical Observations, Chap. xxii, p. 525.

† Chronic Tumor of Sir A. Cooper. Pancreatic Sarcoma of Mr. Abernethy.

ments, as if it could be pushed about from one part of the breast to another. As it enlarges, the gland, being subjected to pressure, suffers a progressive diminution of size, until at length so little trace of it is left as even to require a search for its discovery. This kind of tumor is generally met with in unmarried women between the ages of twenty and forty. It grows with very different degrees of rapidity, sometimes remaining for years no larger than a walnut, and at others in the same period attaining such a size as to weigh several pounds.

Fig. 108.



There is seldom much pain referred to the breast affected, and when it is complained of, the mental uneasiness, excited by apprehension of cancer, is probably the principal cause of its production. If the tumor is small, it may be cut out to relieve the patient's anxiety, and if so large as to occasion inconvenience, its extirpation is more decidedly indicated. In the former case, it is necessary to make a simple incision through the integuments and substance of the mamma, so as to lay open freely the capsule of condensed cellular membrane which surrounds the tumor, and loosely adheres to it; but in the latter, where the morbid growth, from its long standing and large size, may be expected to have induced more or less absorption of the gland, and adhesions of it to the adventitious structure, it is best to remove the whole together. In cutting tumors *out* of the mamma, a troublesome hemorrhage may be expected, from the numerous arterial branches which are divided, and, in addition to a number of ligatures, it is sometimes necessary to stuff the cavity with lint.

[This tumor should be removed with the knife, and then treated with caustics, such as the zinc, as has been already described in the chapter on Cancer. Let the whole morbid enlargement be perfectly removed if a radical cure is anticipated.—R. S. N.]

CYSTIC SARCOMA.

It is comparatively rare to meet with tumors in the mamma, entirely composed of a cystic structure; but cysts are frequently found in growths of a solid kind, particularly the one last mentioned, and are sometimes so large and numerous, as to constitute the principal feature of the disease. Such cystic formations occur at all periods of life, generally in women of a healthy appearance; they occasion little inconvenience, except from their size, and tend to increase without any limitation. Their nature may sometimes be recognized previous to removal, by the imperfect feeling of fluctuation and bluish appearance of their contents, perceived through the thin distended integuments by which they are covered; but, in general, the nature of the structure is not precisely ascertained until it is displayed by a section. The inconvenience which results from the bulk of the tumor, and the risk of its becoming the seat of malignant action, are sufficient grounds for recommending excision of the disease at all stages of its progress; and the operation may be performed with the same favorable prognosis as for the fibrous and vascular sarcoma.

Fig. 109.

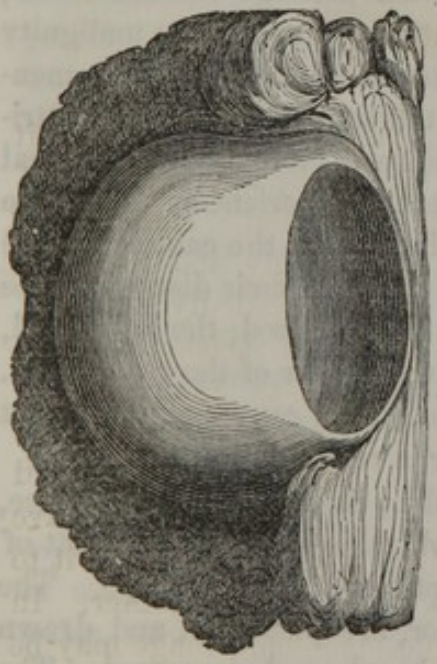


Fig. 110.



[The unilocular cyst is easily treated by puncturing it, and after its contents have been discharged, injecting into the cystic cavity a strong solution of zinc, or caustic potash, so as to get up free suppuration. But not unfrequently there are many small cysts, and if, by chance, suppuration has been set up, we shall generally be compelled to excise the gland. Fortunately, however, these tumors are not of a malignant character, and we are not justified in resorting to harsh measures until they become quite troublesome to the patient.—R. S. N.]

CARCINOMATOUS SARCOMA.

There is no other part of the body in which carcinomatous degeneration occurs so frequently as in the mamma, though a large proportion of the cases in which it has been, and still is too often supposed to exist, if subjected to a more accurate diagnosis, would be referred to other kinds of disease, and particularly to those that have been already considered. Thus the cyst represented in page 501 was removed from a lady who had been declared, by two practitioners of great eminence in Dublin, to labor under incurable cancer. Carcinoma occurs in the breast at all periods of life, from the age of twenty upward; but commences rarely before thirty-five, and most commonly between forty and fifty. It sometimes seems to be called into existence by the irritation of a blow or bruise, and is occasionally preceded by simple induration of the gland; but very frequently no local cause can be assigned, or, if any, it is so loosely connected with the appearance of the disease, as to give no good ground for believing in its operation. The suppression of the menstrual secretion is regarded as a great predisposing, or even exciting, cause of the morbid action, by disturbing the balance of the system; and it has been observed, that distress of mind, errors of diet, and any other circumstances which derange the secretions, tend farther to promote the commencement, and increase the malignity of the disease. I am inclined to think that the cessation of the menstrual discharge does not exert so much influence as is generally attributed to it; and I suspect that this opinion rests more upon theoretical ground, or views of probability, than actual experience. It is true that in women suffering from cancer of the breast, the catamenia are seldom present. But if inquiry be made whether their disappearance or the commencement of the disease was first noticed, the latter will, in almost every case, prove to have been the earlier of the two events.

[I have given in full my views on the causes of cancer of the breast in a previous chapter, to which the reader is referred.—R. S. N.]

Carcinoma of the mamma is recognized by its inequality of surface, extreme hardness, and specific gravity, which is greater than that of any other tissue, sound or morbid, except bone and cartilage. The integuments, when adherent to the tumor, are puckered, and drawn toward it. The nipple is flattened, hardened, and depressed. The patient complains of occasional lancinating pain, shooting through the tumor, and from it in various directions; and she generally betrays, by her greenish-yellow complexion, that depraved state of health, which, whether it be a cause or consequence, or partly both, as is most probable, usually attends such local affections. The course of the morbid process, if it be allowed to proceed, is to engage the glands of the axilla, which become enlarged and indurated; to form ill-condi-

tioned matter in the substance of the carcinomatous masses; to evacuate the contents of these abscesses by ulcerative absorption of the superjacent parts; and thus give rise to sores which prove truly incurable cancers. The pain and discharge that ensue occasion more or less exhaustion of the patient, but are seldom the immediate cause of death, as she generally dies before they produce this effect; and existence is often terminated in such cases so suddenly and unexpectedly, as to suggest the suspicion of a poisonous influence proceeding from the disease. Some time before death, the patient often complains of what she believes to be rheumatic pains, generally extending through the whole body, but being particularly severe in the arm of the affected side, which is often œdematous, numb, and powerless, in a much greater degree than can be well accounted for by the pressure of the swelled axillary glands; and the fatal event is usually preceded for a few days by sickness, loss of appetite, and extreme weakness. Effusion into the cavities of the chest is occasionally the cause of death. The skin sometimes shows a great tendency to assume the diseased action, either being primarily affected with it, or, while the gland is undergoing this morbid change, becoming studded at various distances with flat carcinomatous tubercles, the interstices between which retain the characters of health, or are thick and red. The disease varies greatly in the rapidity of its progress, according to circumstances, which seldom admit of being satisfactorily distinguished, but it generally proceeds more slowly in advanced periods of life.

[The views of Professor Simpson, of Edinburgh, on puerperal fever, go very far to show that the morbid matter may be absorbed, and taken into the circulation. Indeed, it could hardly be otherwise, and I have seen several cases where I believed this to be the case, even before perusing the papers of Professor Simpson.—R. S. N.]

The appearances which are presented by the section of carcinomatous tumors, though they all agree in some respects, differ considerably in others. There is always more or less of a very dense, almost cartilaginous, structure, of a mixed brownish-yellow and bluish-white color, which exists either in the form of compact masses, with bands of a similar substance, that radiate from the center; or in that of capsules, smooth and distinct externally, but gradually softening toward the interior. Within this texture there are, as the disease advances, cavities filled with a soft friable grayish-yellow or brown substance, or thin imperfectly-formed purulent matter. Sometimes the striated appearance produced by the radiating fibrous bands is strikingly marked, while at others, though the carcinomatous texture does not form a capsule, the confines of the morbid formation are very distinctly circumscribed, and there seems to be a mixture of the brown and white dense texture approaching to a granular consistence, and containing small

cells filled with semifluid matter. The distinction between this and the more diffused form of carcinoma should be carefully observed, as it affords some assistance in deciding on the prognosis as to the duration of recovery after the tumor has been removed. When the lymphatic glands suffer carcinomatous degeneration, the morbid structure always assumes the capsular form, unless the disease should be very far advanced, and adhesions to the neighboring parts have taken place. In this case, radiating bands may be discovered, but hardly with the same distinctness that they usually present themselves, when the disease originates in the substance of the mamma.

The cure of carcinoma, whether in the state of scirrhus or cancer, by external or internal remedies, being confessedly impracticable, it does not seem necessary to mention the various means that have been ineffectually employed for this purpose. Leeching, soothing fomentations, and attentions to the general health, alleviate the uneasy sensation of scirrhus, and delay its progress toward ulceration. Poultices of hemlock, and Fowler's solution of arsenic, diminish the agonizing pain of cancer. Solutions of chloride of lime or soda destroy the fetor which proceeds from its discharge, and more or less temporary amendment results from the application of various ointments, powders, and washes, which can never be prescribed with any certainty of benefit, and must be frequently changed to obtain even the slight and transitory improvement that they at best afford. The only method of giving effectual relief is to remove the morbid structure with the knife, the depth and connections of the affected parts rendering other means of extirpation, such as caustic and the ligature, inadmissible. Few questions in surgery have occasioned more discussion than that which has been, and still is, agitated in regard to the propriety of operating. It is admitted that relapse frequently occurs after excision has been performed; but much difference of opinion exists as to the chance of its doing so, and the consequent advantage of the operation. It would appear, on the whole, that the prospect of permanent recovery is not hopeless as it has been represented, provided the operation be performed only in proper cases, and in an efficient manner. Similar diseases are removed from other parts of the body, as the lip, with almost invariable success; but no surgeon thinks of cutting out a cancer of the lip if there be an affection of the glands under the chin; and, in operating, he carries his knife wide of the morbid part, and leaves a perfectly sound surface for healing. In excision of the mamma, on the contrary, a diseased state of the axillary glands is often either totally disregarded, or considered no obstacle to the operation, provided they admit of removal; and the surgeon frequently cuts close to, or perhaps at some points through, the substance of the tumor. It need not, therefore, excite any surprise, or lead to distrust in the

advantage of the operation, to find that the disease frequently returns. The affection of the glands should be regarded as an objection to the operation, not from presenting an obstacle in the way of its complete performance, but rather from affording evidence of a strong tendency in the constitution of the patient to take up the diseased action.

The different cases of carcinomatous disease may be divided into: 1. Those where an operation is altogether improper; 2. Those where it may be performed but with a very unfavorable prognosis; and, 3. Those where it has a chance of proving permanently successful. The first class will include cases in which there are enlarged glands, so seated or connected that they cannot be removed—or where the skin is so extensively diseased that all the morbid portion of it cannot be taken away—or lastly, where there is positive evidence of some other part of the body, as the stomach or uterus, being similarly affected, or of some other internal disease of a serious nature, such as dropsical effusion of the chest. The second class comprehends those cases in which the glands are tainted, but within reach—or in which the disease is in the state of open cancer, or the progress of the morbid process rapid—or the patient's appearance unhealthy. And to the third class may be referred those in which the disease has advanced slowly—feels circumscribed—is not attended with enlargement of the glands, and exists in a person of tolerably healthy appearance. Should the complaint have been distinctly the consequence of local irritation, or the patient be of an age at which the predisposition is generally not very strong, as above sixty, the prognosis will be still more favorable. In very advanced periods of life, as beyond seventy, the diseased action is so low, and the chance of troublesome symptoms consequently so small, that the pain and risk of an operation, however inconsiderable, would in general not be warranted. In my own practice I decline to operate except in cases of the third class just mentioned; and have no hesitation in advising this limitation of interference with the knife, having seen much mischief and no benefit from operations where the glands were affected, though only in a slight degree.

When the operation is to be performed, the patient should be seated on a chair, or laid in a reclining posture, properly supported, and turned toward the light. The nipple, as being a part likely to take up the diseased action, if it has not already done so, and, for the same reason, the whole of the gland, should always be taken away. For this purpose two curved incisions are to be made in the direction of the fibers of the pectoral muscle including an elliptical portion of the integuments together with the nipple; unless the particular circumstances of the case render it more convenient to cut in some other way, so as to remove the whole of the affected integument. In calculating the

direction and extent of the incisions, the object should be, in the first place, to include all the skin that is diseased; and in the second, to leave no more of it than what is sufficient for allowing the edges of the wound to be brought together without straining. The surgeon then, dissecting with the bistoury, exposes the anterior surface of the tumor completely, first separating the lower flap, and then the upper one, while the assistant presses his fingers on the orifices of the divided arteries. In doing this he should proceed cautiously and deliberately, so as to cut wide of the confines of the disease, and keeping in mind that the permanency of recovery is a more important object than the rapidity of the operation. He lastly turns up the edge of the tumor at its axillary extremity, or the other if more convenient, and, with a few sweeps of the knife, detaches the remaining connections, in dividing which no reserve is necessary. The vessels that continue to bleed are then tied; and if there are glands to be removed from the axilla, he next cuts down upon them, seizes them, one by one, with a hook, and partly by cutting, but also by tearing, completes their separation; after which, any more ligatures that seem requisite are applied. It has been proposed in such cases to remove the glands before the mamma, on the ground, that, as the arteries wounded in the operation come chiefly from the axilla, the dissection should be commenced there, in order to avoid cutting and tying them twice over. This advantage is more theoretical than practical, and does not afford any sufficient recompense for the risk and trouble required in digging out the glands, before free access to them has been obtained by removing the mamma. The edges of the wound should be stitched together, and compresses of lint will be useful if placed over the integuments which have been undermined in the operation. A handkerchief or broad bandage, long enough to surround the chest once, ought then to be applied.

[My objections to the views and plan of treatment recommended by Mr. Syme, have been fully expressed already, and as they occur in the same volume, I need not repeat them.—R. S. N.]

MEDULLARY SARCOMA.

The medullary sarcomatous affection of the mamma occurs at all periods of life beyond puberty, but most frequently about middle age. The tumor is recognized by its usual characters of irregularly nodulated surface, and soft elastic consistence, either throughout its whole extent, or at the most prominent parts, which are generally red, either of a dull or bright hue, and exhibit numerous small arborescent vessels. The pain attending the disease varies much in different cases, being at one time very severe, at another hardly perceptible. When there is a strong disposition to the unhealthy action, the complexion of the patient is of a greenish-yellow color, and the countenance has a

peculiar anxious expression. The tendency of the morbid growth is to enlarge; to contract adhesions with the integuments and muscles in its neighborhood; to excite a similar disease in the axillary glands; to suppurate, ulcerate, and fungate; and occasionally in this last stage to throw out blood from time to time, but more frequently a thin watery discharge, which is in general very copious and fetid. The substance of the tumor often protrudes at the ulcerated openings in large masses, which seem nearly in a sloughing state, and are occasionally altogether detached. The bulk of the swelling is thus diminished, but enough of the disease remains to prevent a cure from being accomplished.

The different steps of this process are completed and follow each other with various degrees of rapidity. A few months are sometimes sufficient for the whole progress from the first to the last stage, and on thy other hand, years even may elapse before the disease proves fatal.

All external and internal remedies have been found quite unavailing in the treatment of medullary sarcoma, whether in the mamma or elsewhere, and the only mode of affording the patient relief is to cut out the morbid structure. To this operation the same objections have been urged as to that for carcinoma, and the same considerations ought to guide the surgeon in deciding on the propriety of its performance. If the whole of the diseased parts cannot be taken away, no operation ought to be attempted. If the operation be performed when the morbid process has made a rapid advance — the patient's appearance is unhealthy — the confines of the tumor are indistinctly circumscribed—or when ulceration has taken place, the prognosis will be very unfavorable. If the tumor is of firm consistence — distinctly limited—not adherent—of slow formation—and the patient has a tolerably healthy appearance, the prospect of a durable recovery will be better. The appearances found on dissection also afford important indications in regard to the result. The more soft and bloody the consistence of the tumor is, the more malignant may be regarded the morbid disposition, and the more firm it is, the more fibrous intersecting bands it contains, the more, in short, it approaches the nature of fibrous sarcoma, the less fear may be entertained of a relapse.

[I fully agree with Mr. Syme that the knife alone will not cure medullary sarcoma, but the knife and caustics rightly used, may, and have effected cures time and again. I have already shown how this is to be done, and others have also reported similar success. If one surgeon can cure or mitigate cancer of any sort, others should try the same plan; and if the nature of the disease had been more thoroughly studied, I am persuaded that better success would have attended the treatment of the disease.—R. S. N.]

CHAPTER XIX.

ABDOMEN.

WOUNDS OF THE ABDOMEN.

Wounds of the abdominal parietes, which do not penetrate the peritoneum, require merely the ordinary treatment that is proper for injuries of the class to which they belong. When the peritoneum is implicated, the wound must be regarded as much more dangerous, since this membrane, like all the others of a serous kind, is very apt to inflame when thus injured. There is seldom much internal hemorrhage in such cases, as the pressure of the viscera, which are contained in the cavity of the abdomen, opposes it.

In treating simple penetrating wounds, it is evidently proper, in the first place, to press back any part of the intestines or omentum, that may be protruded through the aperture. This should be done as gently and with as little delay as possible. Great care must be taken also that the protrusion is not merely returned under the integuments, without being fairly restored to the abdominal cavity, especially if the wound be oblique and narrow, as when inflicted by a pointed instrument. In cases of this sort it has happened that the inner opening of the wound so compressed the intestines, or omentum, permitted to remain in it, under the erroneous impression that reduction had been completely effected, as to cause fatal inflammation. The surgeon, therefore, should follow the protruded parts with his finger, and not be satisfied with their replacement until he feels the point of it within the peritoneum, enlarging the wound, if necessary, by means of a probe-pointed bistoury. It is more particularly necessary to observe this precaution when any swelling remains at the seat of injury, or the protrusion tends to reappear after being pressed within the external orifice of the wound. I once successfully reduced a mass of omentum of the size of a walnut, that lay in an oblique wound, of which the inner aperture was not larger than a small quill. The edges of the wound ought then to be stitched together with the interrupted suture, and the patient must afterward be diligently protected from all sources of excitement. A slender diet, cooling laxatives, and moderate depletion, may be employed as preventives of inflammation; and should symptoms of it actually appear, free venesection, followed by leeching, together with warm fomentations of the abdomen, is to be employed without loss of time, since the safety of the patient will

depend in a great measure on the activity and decision with which these means are administered. During the first twenty-four hours, therefore, the surgeon should be constantly on the watch for increase in the frequency or hardness of the pulse, anxiety of the countenance, and tenderness of the abdomen to pressure. Should there be no positive indication that the wound actually penetrates the peritoneum, as from protrusion of the viscera, it ought to be treated with the same attention as if there were—since it is much better to run the risk of being too careful, than to fall into the opposite error of not being sufficiently so. And it would be highly improper to decide the question by probing, as in the case of the wound penetrating, this must necessarily increase the danger of inflammation.

When the intestine is wounded, the injury must be regarded as much more severe, and likely to be followed by the worst consequences. The reason of this will appear from the fact, that whenever the contents of the stomach, or any of the bowels, are effused over the surface of the peritoneum, death is the invariable, and, in general, very speedy result. When this extravasation occurs in consequence of disease, the effect is the same, unless the ulcerative process, that forms the breach in the intestine, is preceded by or accompanied with such an effusion of lymph as limits the extent of the mischief, and confines the extravasation within the bounds of an abscess. It is not easy to understand how the intestinal matters operate thus fatally on the system, when they escape into the cavity of the abdomen; for the patient often dies in a few hours after the discharge takes place, and long before it can be supposed that inflammation has even been excited, far less carried to the extent requisite for destroying life. The symptoms presented are intense burning pain of the abdomen—insatiable thirst—coldness of the extremities—collapse of the features—cold clammy sweat—small frequent pulse—coffee-colored vomiting; in short, the condition induced is nearly that of sinking from mortification. The fatal event generally happens between the twentieth and thirtieth hours, and seldom sooner than the twelfth, or later than the forty-eighth.

[It can be imagined that absorption of the effused matter occurs, and if so, we know well from the nature of the effused matter that it is poisonous and incompatible with life. The contents of the intestines are composed largely of bile, dead cells, and various poisonous matters which have to be promptly removed from the circulation, or we get the same kind of symptoms. I offer this as a suggestion.—R. S. N.]

When death does not ensue until the later periods that have been mentioned, there are always traces of inflammation to be perceived; but when it happens within a few hours after the injury has been sustained, no such appearances can be discovered. This disastrous

effect of penetrating wounds is opposed by the resistance which the surfaces of the neighboring viscera offer to the escape of the intestinal contents, and also by the contraction of the muscular fibers of the bowel at the injured part, which tends to protrude the mucous membrane through the aperture so as to obstruct it. If the effusion is restrained by these means for a short time, it may be prevented altogether by an adhesive exudation of lymph, that soon seals up the orifice, and unites the adjoining surfaces together. The fatal effusion will be most apt to occur when the intestine injured is distended by fluid contents—when the wound is longitudinal in respect to the direction of the canal—and when, if transverse, it is so large as to divide the circumference of the gut to a considerable extent. Extravasation of the contents of the urinary and gall-bladders produces the same effects as that of the intestinal matters.

Internal hemorrhage may occur either from an artery of the abdominal parietes, or from the vessels of the viscera. It is recognized by the usual indications of weakness, coldness, and sickness, together with a feeling of oppression in the abdomen, and, in extreme cases, a fluctuation preceptible on examination externally. On dissection the blood is found either diffused in a thin stratum over the whole peritoneal surface, or accumulated at one part.

In the diagnosis of wounded intestine, probing of every sort is quite inadmissible. The shape and size of the weapon that inflicted the injury, together with the direction and extent of the course which it seems likely to have taken, will afford some ground of probable suspicion; vomiting, or dejection of blood by stool, will not only prove that the gut has been wounded, but lead to a conjecture as to the seat of injury; and the symptoms of intestinal effusion, or the escape of feculent and bilious matters from the wound, will render the case more decided. Should the wounded intestine protrude through the integuments, the extent of the injury may, of course, be determined by simple inspection.

In respect to the treatment of wounded intestine, it is evident, that unless the injured part presents itself to view, no local treatment can be employed to remedy the injury; and that the patient's only chance of recovery will depend upon the powers of the system effecting the process of reparation which has been described. The object of the surgeon should be to prevent this process from being disturbed, with which view, he will be led to enjoin absolute rest, with strict starvation; and, if circumstances require it, will not hesitate to practice free depletion.

[Here, we are told to rely upon the "powers of the system," yet Prof. Syme recommends depletion; this, to me, is very inconsistent.—R. S. N.]

If the injured part of the gut is protruded, the case will be different, and an important question will present itself in regard to the management of the wound. Much variety of opinion and practice has existed here; and it must be admitted, that, though some very objectionable methods have been abandoned, no very satisfactory one has hitherto been devised.

If the wound is very small, and especially if it is seated in a part of the canal not usually distended by its contents, the most prudent course will probably be to return the gut, as if it were sound, without any more ceremony. Should the wound be somewhat more than a mere puncture, and allow its cut edges to be distinguished, a thread ought to be passed through them by means of a round sewing needle, and tied, after which both ends may be cut away close to the knot, and the gut returned, since it has been ascertained by experiments on the lower animals, that stitches inserted into the coats of the intestinal canal are detached by ulcerative absorption toward the interior of the tube, and thus escape with the feculent discharge.* If the wound is so large as to require more than one stitch, as many as seem necessary are to be introduced in the same way at the distance of a quarter of an inch, or less, from each other. If the wound is lacerated or contused, the injured part should be cut away before the edges are joined. And, finally, if the whole circumference of the gut is divided, it may be best to insert only one stitch on the side next the mesentery, so as to keep the two mouths of the intestine together, and then retain the aperture of the canal in correspondence with the external wound, by means of threads passed through their respective edges. A preternatural opening for the discharge of the bowel must thus in all probability be formed in the first instance; but the immediate danger will be diminished, while room is afforded for subsequent reparation, in the way that will hereafter be described.

The viscera of the abdomen, with which may be included the urinary bladder in its distended state, are liable to be ruptured by external violence without the infliction of a penetrating wound. The symptoms are those indicative of extravasation of the intestinal matters; and the result is surely fatal, almost always within the short period that has been already mentioned. It is important to know that the bladder, when much distended with urine, may be ruptured very readily, as by falling on the floor or the corner of a table—since death occurring in such circumstances, may give rise to very serious questions in medical jurisprudence. Urinary effusion from this source, sometimes does not prove fatal before the lapse of several days, and in a case that came under my own observation, the patient survived a week.

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* Travers on Injuries of the Intestines. 1812.

On the evening of the 5th of July, I was requested, by Messrs. Joseph and Benjamin Bell, to see with them a young gentleman who seemed to have had his bladder ruptured. Circumstances prevented me from meeting these gentlemen until midnight, when I learned from them that the patient, a stout youth, seventeen years of age, after dining with his family, had gone out to take a walk, in the course of which he had encountered a low paling, about two feet high, and attempted carelessly to leap over it; but, instead of doing so, had fallen forward, so as to strike the lower part of his belly with great force on the points of two upright spars of wood. He immediately complained of intense pain, and of a feeling as if his bowels had protruded; his brother, who had accompanied him, at the same time remarking that his clothes were distended over the belly. With the aid of support on each side, he then accomplished a few steps, so as to reach a carriage that had been brought as near as possible to the place where he was lying. A catheter had been introduced, and, after drawing off four ounces of bloody urine, allowed to remain in the bladder. We found all the usual signs of ruptured bladder; there being great pain and distension of the belly, with a sunk, anxious look. Twenty leeches and hot fomentations were applied. The catheter was taken out, and an opiate prescribed.

On the following day, the abdominal pains and swelling were increased, there being dullness on percussion below the umbilicus, and more than ordinary resonance above it. The catheter was introduced with the effect of withdrawing a few ounces of bloody urine. In the evening, leeches were again applied, and an opiate prescribed.

Next day, the 6th, he was found to have passed a restless night. There was some confusion of ideas, and considerable impatience for a change of posture, etc. The abdominal swelling had increased, and there was some œdema of the posterior parts from the chest down to the thighs. The catheter was introduced twice, and each time drew off a quantity of bloody urine, similar to that which had been obtained on the former occasion.

On the 8th, he was in much the same state, and not sinking, as we had fully expected to find him; but the whole trunk was fearfully swollen, and his respiration was performed as if only a small portion of the lungs had room to act. The œdematous effusion had greatly increased at the lateral and lower parts, while the tympanitic condition was still more manifest anteriorly and superiorly. Below the umbilicus there was not only complete dullness on percussion, but obscure fluctuation, which, after careful deliberation, induced us to think that an incision in the linea alba, a little way above the pubis, might be of use. After cutting through a thick mass of condensed texture at this part, I saw a stream of clear fluid begin to trickle out, and, wishing to see

the effect of what had been done before proceeding further, we ordered a large soft sponge squeezed out of warm water to be applied so long as the fluid should continue to escape. In the evening, it was ascertained that a very large quantity of urine had passed from the wound, and the abdominal swelling was considerably reduced, while in all other respects the patient appeared to have experienced relief. The catheter had been introduced twice during the day without obtaining a drop of water, although nearly a tumblerful was taken off by it in the morning before the incision.

On the 9th, the pulse had fallen to one hundred. The abdomen was greatly collapsed, and everything seemed favorable, and he continued in this satisfactory state until the following evening, when it was observed that the urine ceased to come freely away, and he became restless, with a return, in some degree, of his former unpleasant symptoms.

On the 11th, there was considerable swelling of the lower part of the belly, with quick pulse and foul tongue. The wound looked dry and white, as in a patient after lithotomy who is suffering from inflammation at the neck of the bladder. We entertained serious apprehensions of the sequel, but thought it right to enlarge the aperture lest there should be any obstruction to the flow of urine. I effected this by means of a bistoury, so freely, that my finger could be introduced down to the muscles, which were found separated from each other in the mesial plane to the extent of an inch and a half, so as to form a narrow slit through which the water passed.

On the 12th, the belly was collapsed. The pulse had fallen to eighty, and the patient was quite easy.

No particular change occurred until the 19th, when a considerable quantity of sloughy cellular substance was extracted from the wound; and on the 21st, in consequence of there being a rather copious discharge of matter from the cavity lying between the integuments and muscles of the abdomen, a free counter-opening was made on each side, as low in the flank as the point of a catheter could be pushed. A great improvement speedily followed the establishment of these drains so far as the superficial parts were concerned, although there was still a copious issue of thick matter from the aperture between the muscles.

On the 26th, seeing a slough at the orifice, I seized it with dressing forceps, and gradually pulled out a bag bearing no small resemblance to the bladder, which was found to consist of dead cellular substance, lined with a white deposit from the urine. I then passed my finger down into the bladder, and felt a rent more than an inch long in the anterior part of the fundus without, or on the pubal side of the reflection of the peritoneum.

On the 5th of August, the patient very unexpectedly passed seven ounces of water by the urethra, though the catheter had been frequently introduced before without obtaining so much as a teaspoonful, ever since the opening above the pubis was made. In the course of a fortnight, the patient was in every respect perfectly well, and quickly regained his strength without the slightest trace of inconvenience from the injury.

As there is not upon record, so far as I know, any well-authenticated instance of recovery from rupture of the urinary bladder by violence, this case may be regarded as of some interest, and also perhaps prove of practical use on such occasions, by suggesting the possibility of affording relief through local treatment. Mr. Benjamin Bell informs me, that while he was a resident pupil in Bartholomew's Hospital, it was found, on examining the body of a child, that in addition to other injuries of a mortal kind caused by the wheel of a carriage, the bladder was ruptured precisely in the same situation as in the patient whose case has just been related. If the rupture takes place above or within the reflection of the peritoneum, there cannot be the slightest chance of escape. But if the rent is at the anterior part, so as to discharge the contents of the bladder by a sudden gush into the cellular substance, and condense it in such a way that merely the portion in contact with the urine is deprived of life, it appears that the patient may be saved by timely incisions.

PARACENTESIS ABDOMINIS.

The abdomen is punctured for the removal of dropsical collections of serous fluid in the cavity of the peritoneum, and for the evacuation of cysts developed in the ovary, which grow so large as to occasion distension of the abdomen. The circumstances of these diseases, which denote the propriety of paracentesis, need not be considered here; and it will be sufficient to explain the mode of performing the operation.

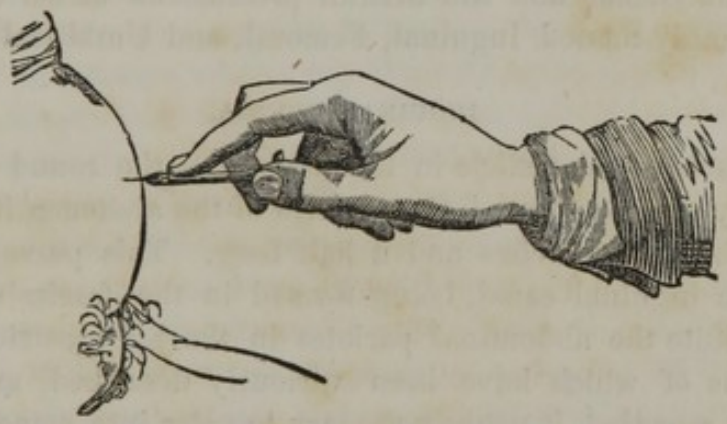
The instruments employed for this purpose consist of a trocar and canula. The point of the trocar may be either in the form of a three-sided pyramid, or have a flattened heart-shaped figure with two cutting edges. The canula of the former is round, that of the latter flat; the first is generally employed, and ought to be preferred, especially in cases of ovarian dropsy, where the fluid is often very thick and viscid. In introducing the three-sided instrument, it was formerly the custom to make a preliminary incision through the integuments with a scalpel; but this is quite unnecessary, and the flat one may of course, be still more readily pushed through the whole of the parietes at once.

Two situations have been chiefly selected for the operation; one in

the *linea alba*, about an inch below the umbilicus; the other, in the *linea semilunaris*, at a point between, and equidistant from, the umbilicus and superior anterior spinous process of the ilium. The former of these ought certainly to be preferred, since there is here no danger whatever of wounding either the vessels or viscera—while, in endeavoring to puncture through the *linea semilunaris*, the surgeon runs a risk of injuring the epigastric artery, which, owing to the unequal resistance of the anterior and lateral portions of the abdominal parietes to the force of distension, comes to run nearly in the middle, between the umbilicus and spinous process. If it should ever be desired to puncture in this situation, the safest plan is to introduce the instrument at the distance of a handsbreadth from the crest of the ilium, in the course of a line extending from the spinous process to the umbilicus.

The patient should be seated on a chair, or the edge of his bed, with the back and legs properly supported. A flannel bandage, nine inches broad, and long enough to surround the abdomen, cross behind, and leave a sufficient hold for an assistant on each side, whose duty is to maintain the pressure as it is diminished by the evacuation of the fluid, is applied.

Fig. 111.



The surgeon then having made an aperture in the bandage, opposite the part where he wishes to puncture, and holding the handle of the trocar in the palm of his hand, while the point of his fore-finger is rested on the abdomen by the side of the canula, pushes the instrument through the thin distended parietes, until he feels that the point does not encounter any more resistance. He then withdraws the trocar, and at the same time insinuates the canula a little farther, to prevent any chance of its escape during the flow of the fluid. When it appears that the cavity has been emptied, the canula may be taken out—a piece of folded lint is placed on the wound—the ends of the bandage, which hitherto have been held by the assistants, are brought round and fastened over the front, or opposite sides of the abdomen—and the patient is replaced in bed.

Hemorrhage sometimes follows this operation, independently of injury inflicted on the arteries. The origin of the bleeding in such cases is very obscure, but may, with some probability, be ascribed to the sudden diminution of pressure which is suffered by the capillary vessels. The occurrence is fortunately very rare, as it does not admit of any remedy, and, indeed, cannot even be discovered until the abdomen is opened after death.

HERNIA.

When the viscera of the abdomen are protruded through the parietes of their containing cavity, while the integuments covering the part remain entire, the displacement is named a Hernia. It was formerly thought that the peritoneum was necessarily torn in such cases, whence the disease was named Rupture; but it has been fully ascertained, that, except in some few rare cases, this membrane always remains entire, and being pushed before the protruded viscera, constitutes a pouch or Sac, as it is called, for their reception. Hernia may take place at almost any part of the abdominal parietes, but does so most frequently through the apertures that naturally exist in them for the transmission of vessels. These are the inguinal and femoral canals, and the umbilicus; and the hernial protrusions which occupy them are accordingly named Inguinal, Femoral, and Umbilical.

INGUINAL HERNIA.

The vessels of the testicle in the male, and the round ligament in the female, proceed through the parietes of the abdomen in an oblique passage about two inches and a half long. This passage, which is named the inguinal canal, being formed in the fasciæ and muscles that constitute the abdominal parietes in the hypogastric region, the connections of which have been variously described, and are still differently regarded, it seems necessary to enter into some anatomical details on the subject. Before doing so, it may be proper to observe that the part of the abdomen, to be particularly considered at present, is that which lies below a line drawn transversely between the anterior spinous processes of the ilium.

Under the integuments and subcutaneous adipose tissue there is here an expansion of condensed cellular substance, constituting a membranous fascia, named *facia superficialis*, not very thick, but comparatively strong, and always very distinct. Beneath this lies a strong tendinous expansion usually named the tendon of the *obliquus externus;* but which, instead of being regarded as subordinate to one particular muscle, ought rather to be considered an independent fibrous structure, like the *fascia lumborum*, or the *fascia lata* of the thigh, since many other muscles are attached to it besides the external oblique.

Much confusion would thus be avoided; and it might be called the tendinous fascia of the abdomen. Within this the recti muscles occupy the space on each side of the mesial plane, as far as a line running parallel with it upward from the tuberosity of the pubis. The internal oblique and transverse muscles cover the remainder of the region under consideration, except a small triangular portion of it near the pubis. On the inner side of this muscular layer, there is a fascia, which was first noticed and described by Sir. A. Cooper. It is very thin, except at the lower part, and has been named the *fascia transversalis;* the peritoneum comes next, and completes the formation of the abdominal parietes.

The three fasciæ that have been mentioned are united together at the line which extends from the spinous process of the ilium to the pubis. They may all be traced distinctly down thus far, but cannot be separated lower without cutting them. The *fascia tendinosa* (tendon of the external oblique) before uniting with the others, turns back upon itself downward, so as to present a thick round border like a hem, which has led to the erroneous appellation of ligament (Poupart, Fallopius) to this part. The internal oblique and transverse muscles lie between the *fascia tendinosa* and *fascia transversalis*. Their fibers at this part are intimately connected, and constitute but an inconsiderable mass of muscular substance; they are attached to the junction of the fasciæ all the way from the spinous process to about a third of its length from the pubis. The *vas deferens* and other vessels which compose the spermatic cord meet together on the outer surface of the peritoneum, about midway between the spinous process and pubis, and about half an inch above Poupart's ligament. They here perforate the *fascia transversalis*, not through a well-defined aperture, but by carrying a thin funnel-like projection of it along with them. Descending obliquely toward the pubis, they become united with some fibers of the internal oblique and transverse muscles, which constitute the cremaster muscle. Having thus escaped from under the edge of these muscles, the cord passes through the *fascia tendinosa* at a sort of slit-like opening about an inch and a quarter long, that extends from the tuberosity of the pubis between the body of the fascia and its inverted margin. From the edge of this slit, which is named the external ring, a thin fascia is continued over the cremaster muscle; and the cord then proceeds into the scrotum, covered by an extension of the superficial fascia of the abdomen, which is continued along with it. The epigastric artery rises from the iliac nearly opposite Poupart's ligament, and running in the direction of the umbilicus, between the peritoneum and *fascia transversalis*, crosses the cord about the middle of the inguinal canal, having nothing interposed except the fascia just mentioned.

Inguinal hernia either descends along the whole course of the cord, or protrudes directly along the external ring. In the former case it is named Inguinal or External Inguinal, and in the latter Ventro-Inguinal or Internal Inguinal. Whether of the one kind or the other, it may either remain confined in its extent to the groin, or getting lower down, distend the scrotum or labium. In the first of these situations it is denominated Bubonocele, and in the others Scrotal or Pudendal Hernia, according to circumstances. There is an important modification of Inguinal hernia which takes place before the cavity of the *tunica vaginalis* ceases to communicate with that of the abdomen. The neck of this process of the peritoneum usually becomes impervious soon after the descent of the testicle, which generally happens about a month before the time of birth. But if the obliteration is delayed longer, or the fœtus is subjected sooner than this to the circumstances which induce the formation of hernia, the viscera are apt to descend into the same bag with the testicle, so that the sac is formed by the *tunica vaginalis*. The merit of detecting this Congenital hernia is usually ascribed to Percival Pott, but unjustly, as Haller first discovered the descent of the testicle and continuity of the *tunica vaginalis* with the peritoneum, and also suggested the probability of hernia in infants taking place in that way, while Dr. William Hunter first established the truth of this explanation by dissection. The contents of Inguinal Hernia usually consist of a portion of the ilium, with more or less of the omentum. Sometimes the *caput cæcum* descends by a gradual extension of its cellular connections, and in this case the intestine of course is not completely inclosed in a sac. The sigmoid flexure of the colon also may be protruded, and, though more apt to descend on the left side, has been found on the right, while there are not wanting instances of the *caput cæcum* being discovered on the left. The Hernia is named Enterocele, Epiplocele, or Entero-epiplocele, accordingly as it contains intestine or omentum alone, or both together. There is no limit to the size of the protrusion, which varies from mere fullness in the situation of the inguinal apertures, to a size nearly equal to the whole intestinal canal.

The causes of hernia may be divided into those which predispose to the disease, and those which immediately give rise to it. The predisposing causes are circumstances which diminish the resistance that opposes the exit of the viscera. Of these the sex of the patient may be mentioned first, since the larger size of the inguinal canal in males renders their predisposition to the disease greatly superior to that of females, so that the proportion which the cases of the former bear to those of the latter is at least a hundred to one. Emaciation and relaxation of the body diminish the resistance remarkably, and some persons seem to labor under a natural peculiarity of structure that exposes

them more than others to the disease. The exciting causes consist in the operation of more than usual compressing force acting on the viscera of the abdomen. Such force is exerted during every energetic effort, especially if made with the superior extremities; since, to give the muscles of the arms firm points of attachment, the chest must be rendered immovable, and this is done by contracting the diaphragm together with the abdominal muscles, while the glottis is kept closely shut. The viscera being thus compressed between the diaphragm and abdominal muscles, are violently forced against the whole surface of the cavity, and if any weak part exists in it, a protrusion takes place. This effect is most apt to happen when an effort is made in the erect posture, for the diaphragm, which then extends obliquely downward and backward, will consequently press the viscera downward and forward in the direction of the inguinal openings. An attention to the same circumstance will afford some explanation of the fact that inguinal hernia occurs much more frequently on the right than the left side, the reason of which appears to be that, when an effort is made, the trunk of the body is usually bent to the opposite side, and, as most vigorous efforts are made with the right arm, the diaphragm will on such occasions generally present its concave surface, and consequently press, toward the right groin. Tight articles of dress, which compress the abdomen, and increase the confinement of its contents without strengthening the parietes at the natural apertures, promote the occurrence of hernia.

The symptoms of inguinal hernia cannot be properly described or understood, without considering separately three different states in which the disease may exist. In the first of these, the viscera return into the abdomen when the patient assumes the horizontal posture, or when moderate pressure is applied to the tumor. The hernia is then said to be Reducible. In the second state the viscera are detained in the sac, but produce no farther inconvenience, when the hernia is said to be Incarcerated. And in the third, the viscera are not only prevented from leaving the sac, but suffer in it such pressure or constriction as impedes the exercise of their functions, and produces other bad consequences, in which case, the hernia is said to be Strangulated.

The symptoms of Reducible inguinal hernia are, tumor in the region of the inguinal canal, colorless, elastic, and compressible, which disappears when the patient lies down, or when moderate pressure is applied. When the viscera return into the abdomen, a gurgling noise or sensation can generally be perceived; and when the tumor is compressed in the hand, the omentum and coats of the intestine are usually recognized by their consistence, which is doughy in the former, and elastic in the latter. The circumstances which occasion Incarceration, are: 1. Thickening and hardening of the omentum, which comes to

resemble the pancreas or even denser structures; 2. Adhesions between the viscera and sac; 3. Distension of the gut with intestinal matters; and 4. The peculiar condition of the *caput cœcum*, which cannot return, except slowly, in the same way it descended, by gradual extension of its cellular connections. The presence of a colorless

Fig. 112.



elastic tumor, of unequal consistence, in the region of the inguinal canal, together with the history of the case, distinguishes the disease. Strangulation depends upon the pressure which is caused by the tough fibrous margin of the inguinal apertures or the condensed neck of the sac. The viscera may begin to suffer from the constriction immediately after their protrusion, or may not do so until long afterward, on the occasion of another portion being suddenly forced down into the sac, or from the intestine becoming gorged with its contents. The symptoms of strangulation are a twisting burning pain referred to the umbilical region, constipation, sickness, and vomiting. The patient's countenance is collapsed, pale, and anxious. His pulse is small and feeble, his extremities are cold, and he cannot rest. The constipation does not depend altogether, as might be supposed, on mechanical obstruction of the bowels, since it is observed where the omentum alone is contained in the hernia, and does not always prove obstinate where the intestine is concerned. It seems to be owing chiefly to the perverted action of the gut consequent on the pressure which it suffers. At first there is little pain referred to the seat of the disease; but if the patient is not relieved, inflammation commences, and then the tumor becomes red, tense, painful, and tender to the touch. This inflammation may extend inward and prove fatal, like peritonitis proceeding from any other source, or it may remain confined to the protruded viscera, and, perhaps leading in the first instance to effusion of lymph, terminate in their mortification, when the patient either dies, or recovery with a preternatural opening of the gut at the groin.

The time required for the completion of this process varies extremely in its different stages. It is observed to proceed most rapidly when the patient is young and stout, and when the hernia is small and recent. It is generally more slow in opposite circumstances, but many exceptions occur, and it is never possible to predict, with any precision, the time that will elapse before inflammation and its consequences are induced. Mortification rarely takes place sooner than eight hours, or later than eight days after the strangulation has commenced.

The treatment of reducible hernia consists in the use of means proper for obviating the predisposing and exciting causes of the disease. With this view, the inguinal region of the abdominal parietes should be strengthened by the mechanical support of a bandage. Various contrivances have been employed for this purpose; but the patent truss of Salmon and Ody is in general so superior in efficiency and comfort, that it does not seem necessary to mention the others. A timely use of this apparatus may prevent the occurrence of hernia in persons whose strong predisposition to the disease is manifested by a fullness perceptible in the groin during the impulse of coughing, and by a painful sensation at the same part whenever the viscera are subjected to more than usual pressure, as in making exertion with the arms, or speaking loud. The predisposition being thus guarded against, all sources of excitement must be carefully avoided. The patient should abstain from every sort of food that, by producing flatulence, or in any other way, causes distension of the bowels; he ought to correct any tendency that may be observed to accumulation in the intestinal canal; and he should never engage in exercises or employments that require severe bodily exertion. In the treatment of congenital hernia, it is of great consequence that the truss should be applied as early as possible, in order that the natural disposition which the parts concerned have to close at the time of birth may be allowed to exert its effect, and a radical cure be thus obtained. Beyond this age, if a bandage is ever required, it can very rarely be afterward dispensed with.

In the treatment of incarcerated hernia, the object should be to remove the obstacles which oppose reduction. The intestines should be unloaded by the free administration of purgatives and injections. If there is reason to suppose that the resistance to the return of the protruded parts depends on thickening and induration of the omentum, which sometimes can be felt through the parietes of the tumor, the patient should be confined to bed, restricted to a slender diet, and depleted, from time to time, by bleeding, or cathartics, with the view of producing, during the general emaciation of the body thus induced, a sufficient diminution of the omental mass to permit the accomplishment of reduction. In the case of adhesions existing between the

viscera and sac, the only practicable mode of overcoming the difficulty would be to lay open the contents of the hernia, and separate their morbid connections. Operations have accordingly been performed for this purpose, but their almost uniformly fatal result ought to deter all prudent surgeons from repeating such attempts. And if the gentle means above-mentioned should prove unavailing, it will be better to advise the patient to be satisfied with such palliation of his complaint as may be obtained from strict attention to the state of his bowels, abstinence from all violent exertions, and the support of a bag truss, than to endanger his life by trying to effect a radical cure with the knife.

The strangulated condition of hernia, being attended not only with extreme suffering, but also with great and immediate danger, demands the most speedy and decided assistance of the surgeon. His first object is, of course, to effect reduction; and this he immediately endeavors to perform by a careful manipulation, which is named the Taxis. The patient should be laid reclining, with his shoulders and pelvis slightly elevated, to relax the parietes of the abdomen; and with the same intention, the thigh of the affected side should be bent upward and inward, as the *fascia lata* is thus prevented from causing any tension of the abdominal fasciæ to which it is connected. The hernial tumor is then to be grasped at its neck, and compressed with the points of the finger and thumb, which, at the same time, pull it slightly outward. The size of the parts at the ring having been thus diminished, the pressure is to be directed gently but steadily upward, in the direction of the inguinal canal. When, in consequence of this proceeding, the slightest gurgle is heard or felt, or the size of the swelling is perceptibly diminished, the reduction, in general, may be very soon completed. The larger the hernia is, the more may be expected from this manipulation, and *vice versa*. There is almost always some serous effusion into the cavity of the sac, and in small tumors, especially those of recent production with acute symptoms, the bulk of the fluid bears a large proportion to that of the intestine or omentum. External pressure, consequently, however carefully employed, cannot possibly have its effect confined to the neck or any other portion of the strangulated parts, since, through the medium of the fluid, its force must be diffused over the whole surface, and, therefore, urge the entire mass against the narrow aperture by which it is required to return. While circumstances are thus opposed to the beneficial influence of pressure from without, it is obvious that the small size of the protrusion, which is often not larger than the point of the finger, and seldom exceeds that of a walnut in most cases, will afford little resistance to an effect in the opposite direction. It accordingly often happens that after the taxis has failed, the tumor suddenly and, as it seems, sponta-

neously disappears, no doubt, through the operation of some internal change in the condition of the bowels or omentum.

Such being the case, in the event of the taxis failing, it is obviously proper to use means that may produce some effect of the kind requisite for *withdrawing* the protruded parts into the abdominal cavity. Of these may be mentioned a change of posture, by elevating the pelvis and bending the shoulders backward, in order to make a drag on the strangulated viscera—the administration of enemata to evacuate the intestines, and thus lessen the resistance to return—bleeding largely to diminish the contractile tone of the muscular fibers—using the warm-bath with the same view—and in addition to it also employing opium or tobacco. The application of cold externally, and the internal use of tartrate of antimony, or purgatives, are means occasionally resorted to, but with more questionable advantage.

The choice of means for the purpose of promoting reduction must be determined by the circumstances of the case. When the patient is strong or plethoric, it will always be right, in the first instance, to abstract a considerable quantity of blood. Repeated injections, or the warm-bath if it can be procured, should also be constantly employed. In regard to tobacco it is necessary to be cautious, lest too great depression be induced by its use, so as to render the patient unable to bear an operation in the event of this measure proving necessary. The safest plan is to inject ten or twelve grains infused in an English pint of water, and repeat this if it seems requisite. The bowels having been thus, if possible, unloaded, and the spasmodic tension of the abdominal muscles, which is caused by the irritation of the disease, and reacts injuriously upon it by tightening the fasciæ which produce the stricture, having been subdued or diminished, the taxis is again to be tried. If a patient and careful trial of it should fail, in the more favorable circumstances that now exist, the surgeon must think of removing the resistance by dividing the stricture with the knife. It is difficult to determine how long the operation may be safely deferred, as inflammation and gangrene supervene much more quickly in some cases than in others. The best course is to operate so soon as a fair trial has been given without success to the taxis, and the measures which promote it, especially bleeding, and the warm-bath if it can be procured. It should be recollected: 1. That the danger of the operation itself is very inconsiderable; and that, consequently, the patient should not, from fear of incurring it, be subjected to the greater risk, or rather almost certainty, of a fatal issue, which attends the disease when allowed to follow its own course. 2. That the progress of the bad consequences is usually rapid, in proportion as the hernia is small, recent, and tense. 3. That in small recent hernias there is least advantage to be expected from waiting. 4. That in

large hernias, strangulated in consequence of congestion, there is most assistance to be looked for from the continued use of purgatives and injections. 5. That the operation is attended with least danger in cases where the tumor is small and recent; and with most where it is large and of old standing.

When the operation is judged necessary, the patient should be brought to the edge of his bed, so as to present the groin in a favorable position. His shoulders ought to be elevated, and the thigh of the affected side is to be slightly bent. The operator having shaved off the hairs, makes an incision about three inches long, in the direction of the inguinal canal, beginning rather above the commencement of the tumor, and continued down the middle or most projecting part of it, toward the bottom. This incision is most conveniently accomplished by lifting up a fold of the integuments, together with as much as possible of the loose cellular tissue exterior to the tense parietes of the tumor, and running the knife through it with the back turned toward the sac. If the superficial epigastric, or any other artery of the integuments which may have been cut, threatens to bleed much, it should be tied before going farther. The surgeon has then to divide the layers of fasciæ which cover the sac; and the old method of doing this was to cut them successively upon a grooved director thrust under them, so as to elevate portion by portion. Instead of a practice so tedious and perplexing, it is better to dissect down to the peritoneum, either by cutting through the fasciæ as they lie stretched upon the sac, with the hand unsupported, as Scarpa advises, or by raising them with the forceps, cutting the fold thus elevated with the knife held parallel to the sac, and then dividing each layer in succession, upward and downward, to the extent of the external incision. The best instrument for this purpose is the knife. It is generally said, that the peritoneum may be recognized by a bluish appearance which it presents, owing to the presence of fluid contained within it, and by its more loose connections than those of the superjacent parts; but these characters are deceptive; and it is fortunately not necessary that this recognition should be effected previous to opening the sac. If it is opened in the same way that has been recommended for cutting through the fasciæ, there will be no danger of wounding the contained viscera; and so soon as they are exposed, the dark color of the intestine, and the smooth, glistening, internal surface of its peritoneal covering, which contrasts remarkably with the rough and bleeding external surface of the sac and those of the fasciæ, independently of any other signs, will at once assure the surgeon that he has opened the sac. When the hernia is small, its coverings and the sac ought always to be divided first at the fundus or bottom of the tumor, as they are there most apt to be separated from the intestine by serous fluid, which is

almost always present in more or less quantity, and sometimes constitutes the principal part of the swelling. In a small hernia also, the sac should be opened throughout its whole extent; but if it is large, merely such a portion of its neck as may be sufficient for allowing the stricture to be reached and divided. If the presence of fluid could be depended upon there would be no danger in opening the sac; but as it is occasionally, though certainly very seldom, absent, so that the peritoneal covering lies in close contact with the strangulated parts, it would be extremely imprudent, in any case, to operate with reliance on the protection which is thus not certainly afforded. The safest mode of proceeding is to pinch up a small portion of the sac with the forceps, and then to divide it, holding the knife parallel with the surface of the tumor. Wherever an aperture, however small, is made, fluid, if any is contained in the cavity, escapes, and the smooth shining surface of the contained viscera is readily recognized. While the forceps still retain their hold of the membrane, a blunt-pointed curved bistoury should be introduced and carried to the requisite extent, with the additional protection of the operator's finger interposed between it and the intestine.

After the protruded viscera have been exposed, the next step of the operation is to divide the stricture. This might be done in any direction, were it not that the epigastric artery and spermatic cord, lying in the neighborhood of the neck of the sac, limit the choice within more narrow bounds. When the hernia protrudes through the internal opening of the canal, it is seated anteriorly to the cord, and has the epigastric artery on the pubic side of its neck. In cases of old standing, where the tumor attains a large size, the spermatic vessels are sometimes separated from each other, and found on the lateral, or even anterior part of the sac. In such cases, too, the obliquity of the canal becomes much diminished, and it is often at length impossible to tell, by external examination, whether the hernia is external or internal; in other words, whether it has passed through the whole course of the canal, or escaped directly through the external ring. When it is of the latter or ventro-inguinal kind, the cord lies on the iliac side of its neck, behind which it crosses obliquely downward, and the epigastric artery is also on the same side running upward and inward. It appears, therefore, that if the stricture were divided by cutting toward the pubis, the epigastric would be endangered in the former case; and that, if the knife were carried outward, it would, in the latter, subject both the epigastric artery and the cord to the risk of injury. As it is often difficult, and sometimes impossible, to ascertain positively, either from the examination of the tumor, or from its previous history, whether the vessels are situated on its iliac or pubic side, the safest plan is to cut always upward, in which direction there can never be

any risk incurred. The simple probe-pointed bistoury, which has been employed for the preliminary part of the operation, is the most safe and efficient instrument for dividing the stricture. The surgeon should introduce the fore-finger of his right or left hand, according to circumstances, between the sac and viscera as high as he can, and then, feeling the stricture with its point, carry up the knife with its side turned toward the finger, until it is insinuated between the intestine or omentum and the sac; when turning its edge upward, he raises the handle gently but steadily, and repeats this process until he perceives that there is a free passage for his finger into the abdomen.

The third step of the operation consists in the management of the protruded viscera. If the hernia is recent, and inflammation has not been excited, the intestine and omentum present nearly their usual appearance, except that the former is more or less thickened in its coats, and has a dark, purple, or browish color. In such circumstances, the gut should be returned first by gentle pressure, similar to that employed in the taxis, and then the omentum. If effusion of lymph has taken place on the surface of the intestine in consequence of inflammation, the reduction may be performed as in the former case, but, of course, with a less favorable prognosis. If old adhesions, existing between the surfaces of the intestine, or between them and the sac, oppose reduction, they ought to be divided when this is practicable, and when it is not, the parts must be left to themselves; the integuments being brought together, or simply covered by a pledget of ointment. It might be expected that more of the intestines would thus be permitted to escape, but it is found that when the stricture has been freely divided—the functions of the bowels restored—and the patient confined to the horizontal posture, the protrusion gradually diminishes, and finally withdraws itself into the abdomen. The same practice is proper when the *caput cœcum* has descended. Should the omentum be so thickened and indurated as not to permit reduction, it may be cut away as far as is necessary, any vessels that require ligatures being tied. But from what has fallen within my own observation, I am quite sure that it is better either to return the omentum, if possible, or to leave it still remaining in the sac, than to practice excision of the indurated portion, since there is thus incurred a risk of several bad consequences. In the *first* place, whether from the wound alone or the ligatures, which are frequently required in considerable numbers, inflammation is apt to be excited; and *secondly*, that most troublesome and dangerous occurrence, ulceration of the intestine, is apt to happen, probably from the bowel adhering to the wounded part of the omentum, and losing the protection of its serous covering, which is slow to undergo the ulcerative process. Lastly, when the intestine is discovered by its soft consistence and fetid odor

to be in a mortified state, any attempt at reduction would be highly imprudent, since the patient's only chance of escape from the fatal effusion of its contents into the abdominal cavity, depends upon lymph being thrown out and around the mouth of the sac. If this barrier be broken up, death will inevitably happen, and therefore the surgeon should either leave the contents of the hernia as he finds them, or limit his interference to laying the gut freely open if it is not so already, after which a soft poultice, or pledget of emollient ointment, may be placed on the part. After the operation, unless circumstances should require the wound to be kept open, its edges ought to be drawn together by stitches, and have a thick compress of folded lint supported by a bandage applied over them.

When things go on well the patient experiences relief almost immediately after the operation. The tormenting pain of the umbilical region, the sickness, and the vomiting subside, the warmth of the body becomes uniformly diffused, the anxious expression of the countenance disappears, and a full, soft, moderately frequent pulse gives further indication of the salutary change that has taken place. In the course of an hour or two, one or more, usually several, copious evacuations of the bowels, show not only that the gut has been relieved from mechanical obstruction, but that it has been restored to the due performance of its functions. If this favorable event does not occur spontaneously within three or four hours, it ought to be gently solicited by giving a tablespoonful of castor oil, which may, if necessary, be followed by the injection of a mild enema. Tenderness of the abdomen, or uneasiness felt in it independently of pressure, will suggest the immediate application of warm fomentations, and if it should increase, or be accompanied with acceleration of the pulse, heat of skin, thirst, anxiety, or restlessness, general bleeding, and leeching of the abdomen must be resorted to without delay, decidedly and freely, so as if possible to subdue the incipient peritonitis. Opium and calomel ought then to be administered in doses proportioned to the urgency of the circumstances, and tobacco injections, as well as the solution of tartrate of antimony, are very useful in relieving pain and allaying any tendency to overaction that may remain after the force of the inflammation has been broken. In consequence, probably, of the pressure which has been sustained by the gut while strangulated, and which there is reason to believe generally occasions a certain degree of constriction in the canal for a considerable length of time subsequent to reduction, the patient is frequently annoyed for days or weeks with occasional symptoms of chronic inflammation, for which gentle aperients, administered by the mouth and rectum, leeching, and the counter-irritation of blisters, or tartrate of antimony, are the best means of counteraction. It is not prudent to get out of bed, or, at all

events, to quit the horizontal posture until the wound is so far healed as to permit the wearing of an efficient truss, which can hardly ever afterward be dispensed with.

Upon the 13th of October last, I was asked by Mr. Sidey and Dr. Newbigging to see a patient, who appeared to be suffering from an internal strangulation of the bowel.

He was a man of about fifty-five years of age, the butler of a family in town; stout in frame, and rather corpulent. For eleven years, he had been troubled by an inguinal hernia of the right side, and had worn a truss to prevent its protrusion, until the last six weeks, during which, he had not observed any swelling, although the bandage had not been used, in consequence of five months having elapsed without any appearance of it. At twelve o'clock of the preceding night, he had suddenly felt very ill, and sent for Mr. Sidey, who saw him at one o'clock in the morning, complaining of intense abdominal pain, with quick pulse, cold perspiration, and vomiting. Upon careful examination, a tumor, about the size of a hen's egg, was felt in the right iliac region, without any external enlargement or thickening of the parietes of the cavity. Leeches were applied and several injections administered during the night, with some palliation, but no material alteration of the symptoms, which continued much the same as they have been described, until we met about two o'clock in the afternoon—fourteen hours from the commencement of the attack.

As there could be no doubt that strangulation of the bowel existed, we examined the suspected region with all the care in our power, but, probably from the abdomen having become more distended, without being able to detect the tumor which had been felt the night before. All that we could perceive, was a slight degree of induration or resistance, opposite the internal ring, over a space not much larger than the point of a finger. In these circumstances, I should not have felt justified in undertaking any operation, unless Mr. Sidey's accuracy of observation had been well known to me, and, in absence of any positive information that could be obtained at the time of our examination, rendered his detection of a tumor in the first instance sufficient ground for surgical interference.

Having placed the patient in a convenient position, I made a free incision of the integuments throughout the whole extent of the inguinal canal, tied the superficial epigastric artery, which had been cut, inserted my finger through the external ring, and guiding upon it a probe-pointed curved bistoury, divided the aponeurosis of the external oblique, up to the internal opening for the cord. There being still no appearance of a tumor, but a more distinct feeling of resistance, I divided the other coverings of the cord, and brought into view a dark-colored mass, at the internal ring. Pulling this toward me, I readily

drew out a hernial sac, about the size of a hen's egg, which being opened, was found to contain a portion of the small intestine. Searching for the stricture, I encountered a difficulty from the sac yielding to the slightest pressure, and returning with its contents into the abdomen. I therefore seized it with a pair of forceps, and thus obtained the requisite tension, until I succeeded in passing the edge of my nail beyond the stricture, and guiding the bistoury upon it, effected the dilatation necessary for accomplishing reduction of the strangulated part. The patient was speedily relieved from all his distress; and, although a very unfavorable subject for any operation, through the kind and judicious management of Mr. Sidey, recovered completely, and is now quite well.

There seems to be considerable difficulty in satisfactorily accounting for the strangulation. It was evidently caused by the neck of the sac; but whether the hernial pouch had remained empty until the symptoms were produced by the entrance of intestine, or whether the contents had previously been in a state of incarceration, is a question that admits a difference of opinion. Mr. Sidey informs me that, about three weeks before the operation, the patient suffered for two or three days from colic pains, but not of such a character as to suggest the suspicion of hernia; and the stricture was so extremely tight, that I can hardly suppose the intestine could have been imprisoned, without affording signs of being so.

This case will, I trust, afford encouragement to operate for the remedy of hernial tumors, reduced in a state of strangulation; and may also be regarded as possessing some interest from being, so far as I know, the only instance of recovery from a hernia which has become strangulated within the abdomen.*

When sloughing of the contents of the hernia takes place, a discharge of the intestinal matters always ensues for a time through the opening thus established in the gut. The cavity of the sac gradually diminishes, its orifice contracts, the integuments surrounding it become callous, and a preternatural anus is formed. If only a part of the circumference of the intestine has been protruded, the remaining portion allows some of the contents of the canal to descend naturally, and by degrees more of them until little and at last none are voided in the groin, the opening of which closes, and then the patient obtains a complete cure. The process of reparation is accomplished with difficulty, in proportion to the extent of gut that has been destroyed, and when its whole circumference has sloughed, a complete loop of the intestine having been strangulated, it can hardly be effected without some artificial assistance. In this case, the two contiguous walls of

* Monthly Journal, Jan., 1850.

the gut constitute a septum which directs the flow of matters passing through the canal, so as to make them issue at the preternatural orifice; and sometimes the upper part of the tube is inverted, and protrudes through it, forming a tumor of various size in the groin. Different methods have been employed for dividing this septum, and thus promoting the natural changes that lead to recovery. Incision is dangerous from the risk of cutting too much, and allowing the intestinal matters to be effused into the cavity of the abdomen. A ligature passed through the septum by means of a needle, which was first thought of by Dr. Physick, of Philadelphia (1802), is more safe in the first instance, but must subject the patient to the chance of symptoms similar to those of strangulated hernia; and the plan of M. Dupuytren (1813) seems to be, on the whole, the best. It consists in compressing the septum between the blades of forceps, made to meet very accurately, the one being received into a groove of the other, and regulated in their approximation by a screw. The pressure is thus completely under control, and can be increased, diminished, or altogether withdrawn, according to circumstances.

The sloughing of a hernia is not the only cause of preternatural anus. It may be produced also by ulceration of the intestine after it has contracted adhesions to the parietes of the abdomen, or by wounds. It is always a source of extreme annoyance, and sometimes occasions dangerous symptoms, by the aperture proving inadequate to discharge the contents of the gut, while they are prevented from descending by their natural route. The treatment, therefore, deserves much attention. In the first instance, it is sufficient to keep the part clean, and prevent eversion of the upper extremity of the gut by applying gentle pressure, which is also useful by directing the feculent matters into their old channel. If the gut has become everted, it ought, if possible, to be immediately reduced; and in case this cannot be accomplished, its more gradual return must be promoted by permanent pressure, slender diet, and the horizontal posture. Should the aperture not contract, though there is no protrusion of the intestine, it may be concluded that a septum exists between the two extremities of the tube above or below the aperture; and its situation having been ascertained by careful examination, the compressing instrument of Dupuytren is to be cautiously employed. The blades of the forceps should be at first very gently approximated, and never tightened so as to occasion any disagreeable symptoms. When the piece included is detached by ulceration, and the forceps fall off, the case must be treated by gentle pressure, and attention to the bowels, as if the septum had not existed.

[The importance of this subject has led some very excellent surgeons to direct their inquiries specially for the solution of some of its

problems and phenomena. Among those who have instituted inquiries, may be mentioned Dr. Thomas Bryant, Esq., of London, who found that *inguinal* hernia is more common than femoral hernia by nearly seventy-eight per cent., and that it commences most frequently between the ages of twenty and forty years; and that it does not, on an average, become strangulated before the expiration of twenty years. It seems hardly ever to pass beyond the age of fifty before it becomes strangulated, whether it may have been of early or late origin. Inguinal hernia requires operations less often than femoral, but operations for it are less successful than those for femoral hernia. These facts are derived from an examination of one hundred and twenty-six fatal cases, collected from the records of Guy's Hospital.

When operations are necessary, Mr. Bryant agrees with Mr. Syme, in declaring that they should be performed at an early period. Mr. Syme has given abundant reasons for this choice. As operations for hernia, whether of the one kind or the other, are to be avoided as far as possible, I here introduce the new mode of Baron Seutin for reducing strangulated hernia:

"The patient is laid upon his back, with the pelvis raised much higher than the shoulders, in order that the intestinal mass may exert traction upon the herniated portion. The knees are flexed, and the body is slightly turned to the opposite side to that on which the hernia exists. The surgeon ascertains that the hernia, habitually reducible, cannot be returned by continuous and moderate taxis. He next seeks with his index finger for the aperture that has given issue to the hernia, pushing up the skin sufficiently from below, in order not to be arrested by its resistance. The extremity of the finger is passed slowly in between the viscera and the herniary orifice, depressing the intestine or omentum with the pulp of the finger. This stage of the procedure demands perseverance, for at first it seems impossible to succeed. The finger is next to be curved as a hook, and sufficient traction exerted on the ring to rupture some of the fibers, giving rise to a cracking very sensible to the finger, and sometimes to the ear. When this characteristic crack is not produced, the fibers must be submitted to a continuous forced extension, which, by distending them beyond the agency of their natural elasticity, generally terminates the strangulation. This mode of procedure is more applicable to Gimbernat's ligament, the hooking and tearing of which are more difficult than in the case of the inguinal ring. Considerable strength has sometimes to be exerted, and the index finger becomes much fatigued. When, in consequence of the narrowness of the ring, the finger does not at once penetrate, it is to be pressed firmly against the fibrous edge, and inclined toward the hernia. After a time, the fibers yield and the finger passes. When the finger becomes fatigued, it is not to be with-

drawn, but it should be supported by the fingers of an intelligent assistant, who seconds the action it is desired to produce. In inguinal hernia, the traction should not be exerted with the finger upon Poupart's ligament, but in a direction from within outward, and from below upward, by which the aponeurotic layers between the two ligamentous pillars constituting the inguinal aperture are easily torn through.

The ring is then enlarged by this tearing, just as if it had been divided by a cutting instrument, or largely dilated, and reduction takes place easily, by performing the taxis in a suitable direction. The mobility of the skin, its laxity in parts where hernia prevails, and its extensibility, greater in proportion to its thinness and to the absence of a lining of fatty cellular tissue—by allowing the sliding and the thrusting of this membrane in front of the finger it cushions, affords protection to the intestine from all immediate contusion. When the strangulation is induced by the issue of a considerable mass of intestine, or an accumulation of fæcal matters, it is desirable first to disengage one of the extremities of the noose, and to seek to expel the gas or fæcal matters by moderate pressure, in order to facilitate the reduction of the tumor. In the few cases in which the finger cannot be introduced, a small incision may be practiced in the skin, and the handle of a spatula or any blunt instrument may be passed in by separating the cellular tissue. Pressing this against the border of the ring, while avoiding the intestine, this orifice may be eroded or dilated without danger. The greater the resistance offered by the aponeurotic fibers, the greater will be their tension, and the more easily will their laceration be produced.

As a general conclusion, it may be laid down, that the facility and promptitude of this procedure, and the immunity that attends ought to diminish the gravity of the prognosis of strangulated hernia, by rendering the circumstances under which recourse need be had to an operation quite exceptional. Such exceptional cases will be found: 1. In old, irreducible hearniæ. 2. When the strangulation in inguinal hernia occurs at the internal ring. Generally the external ring and inguinal canal are large, and allow of the easy penetration of the finger; and then the new method is applicable, and the rupturing or dilatation of the internal ring should be attempted, and the maneuver is rendered easier by the fact, that in these cases the canal is much shortened, and the two rings much approximated. If, however, the external ring is too narrow to admit the finger, an operation is required. 3. When there are general symptoms of a gangrenous state of the intestine."*

This seems to me to be one of the most rational modes ever yet

* Med. and Chir. Rev., July, 1856.

devised, and it has certainly acted well when I have had an opportunity of testing it. The expiratory method of Dr. Andrew Buchanan, of Glasgow, may be associated with that of Baron Seutin:

"The peculiarity of the method consists in this, that just before the force is applied the patient is directed to make a very full expiration, and thereafter to refrain as long as possible from making a fresh inspiration; or, as it is more intelligibly expressed to the uninitiated, he is directed to blow as much air out of his mouth as he possibly can, and to continue thereafter as long as he can without drawing a fresh breath. While this is going on, the operator, having made all necessary preliminary arrangements, attempts to return the hernia, beginning as soon as the expiration is a little advances, and continuing his efforts gently but steadily during the whole period of suspended respiration. When the patient is at length compelled to draw a fresh breath, the pressure should be relaxed, so as not to oppose the force of the muscles of inspiration; but it should not be altogether given up, and as soon as the patient is a little recruited from his exhaustion, he is made to perform another expiration, and so the operation is continued as long as may be required. The first indication of success, consisting in a slight internal motion or gurgling noise in the tumor, almost universally occurs during the suspension of the breathing, and it is during the same period that the complete return of the hernia is usually affected.

"The theory of this operation is simple. In the first place, it disassociates the diaphragm from the abdominal muscles, and, by preventing them from acting in concert, removes the chief obstacle to the reduction of hernia. Secondly, it weakens the muscular power of the body, and diverts it from the act of resistance."*

Of course both these plans will be facilitated, in the first place, by relaxing the patient, which may be easily and safely effected by almost any nauseant, as lobelia, sanguinarin, and more perfectly by veratrin. The recommendation of Mr. Syme to bleed as one of the means to produce relaxation, it seems to me, is well calculated to defeat all hopes of making a speedy and radical cure. When purgatives are needed, we should not use calomel nor any other cathartic acting as it does. For the same reason, I would object to the use of podophyllin. We require a light and promptly acting cathartic, such e. g. as cream of tartar.

Operations will sometimes be necessary, and of the various plans for operating none are preferable to those of Mr. Syme. The instruments of the present day are very perfect, and it is to them that we must attribute the unfrequency of operations for hernia; as the preva-

* Glasgow Med. Jour., 1856.

lence of hernias in the United States is very great; a fact which may be owing to the laborious exercise of our agriculturalists, and those engaged in all those trades where frequent heavy lifts are to be undergone. Notwithstanding the prevalence of hernias, we seldom hear of fatal consequences attending them where the parties are able to procure proper trusses.—R. S. N.]

FEMORAL HERNIA.

The femoral vessels descending along the inner margin of the *psoas magnus* rest upon a fascia which covers that muscle, together with the neighboring *iliacus internus*, and also lines the cavity of the pelvis. This *iliac fascia*, as it is named, is united to the *fascia transversalis*, so as to appear quite continuous with it, when both are brought into view by stripping off the peritoneum from the inner surface of the abdominal parietes. They leave, however, an oval aperture to let the vessels pass through them, which it is necessary to consider particularly. The union of the two fasciæ is continued from the pubis for about an inch and a half toward the ilium, in the direction of the *linea oleo-pectinea*, where it terminates by a sort of crescentic margin, that is seen very distinctly when the parietes are held up and surveyed from the inner side, after the peritoneum has been removed. Where the fascia thus meet together, they are intimately and inseparably connected with the reflected margin of the tedinous fascia of the abdomen (tendon of the external oblique) which is attached to the tuberosity and crest of the pubis, and also with the superficial fascia of the abdomen, together with the *fascia lata* of the thigh. On the iliac side of this crescentic margin, with the interposition of some loose cellular substance and fat, the vessels lie, resting on the *fascia iliaca* which here becomes attached to the bone, and covered by the union of the three abdominal fasciæ, which form a bridge over them that has been named the crural arch. Between the vessels and spinous process the iliac and *transversalis fasciæ* again unite, and allow the *iliacus internus*, together with the *psoas magnus* muscle, to pass under them to the *trochanter minor*. The fasciæ are here closely connected with the vessels, or rather with their sheath of dense cellular substance, in which they insensibly lose themselves when traced by dissection. The vessels are now, properly speaking, in the thigh, and become covered with the *fascia lata*, which has an oval aperture in it on their pubal side, immediately below Poupart's ligament, through which the *vena saphena* finds access to the femoral trunk. The *fascia lata*, at the margin of this aperture, loses itself on the sheath of the vessels. On their pubal side it passes up, resting on the pectineus muscle, and becomes continuous with the iliac fascia and on the iliac side, while uniting directly with the abdominal and

pelvic fasciæ, it sends a falciform process inward over the vessels to the pubis, so as thus to enter into the formation of the crural arch throughout its whole extent. It thus appears that the femoral is separated from the inguinal canal, merely by the *fascia transversalis* and reflected margin of the tendinous fascia (tendon of the external oblique).

When the viscera protrude through the space between the vessels and crescentic margin of the crural arch, they constitute what is called a Femoral Hernia. The sac in this case is covered by no fascia, properly speaking, having superjacent to it merely the loose cellular substance, which occupied the passage, and the thick mass of cellular substance, glands, and fat, which lies in the triangular hollow at the upper part of the thigh between the pectineus and sartorious muscles. This irregularly laminated and tough tissue, when stretched by the tumor, often presents, on dissection, the appearance of layers, but these are very variable in number as well as thickness, and cannot be distinguished in an operation. The fasciæ, therefore, are interesting in regard to femoral hernia, merely in so far as they constitute the stricture that opposes the reduction of the bowels.

The causes of femoral, like those of inguinal hernia, are predisposing and exciting. The predisposition to femoral hernia is nearly as much greater in the female, as that to inguinal hernia is in the male, owing to the breadth of the pelvis in the former sex, and the consequent width of the femoral apertures. The exciting circumstances are similar to those that have been mentioned, but are apt to be assisted in their operation by the distended state of the abdomen to which females are liable from pregnancy; and many of the femoral hernias which occur in practice are accordingly referred to the violent expulsive efforts of parturition. The ilium and omentum are the parts usually protruded. The tumor is generally of a small size, and sometimes can be discovered only by feeling in the situation where it is suspected. On account of this circumstance, which is apt to conceal the disease from the patient, and also because females are apt to be prevented by feelings of delicacy from disclosing its existence, it is prudent on all occasions, where symptoms indicative of hernia are complained of, to insist upon an examination of the groins.

The diagnosis of femoral hernia is often more difficult than that of inguinal. When reducible, it may be confounded with psoas abscess pointing under Poupart's ligament, and in the two other conditions of incarceration and strangulation it is frequently distinguished with difficulty from swelling or inflammation of the inguinal glands. If the tumor depends on a reducible hernia, it will disappear under moderate pressure, or by assuming the horizontal posture; but if it is owing to a collection of matter, though lessened perhaps, it

will not be entirely removable by pressure, however carefully applied, so long as the patient remains erect. From chronic swelling or acute inflammation of the glands, it may be distinguished by the thickness and fixture of its neck—its more smooth and globular surface—and generally by its history. If a hernia, the tumor will either have existed for a length of time previously, and given indication of its nature by some of the characteristic symptoms, or have appeared suddenly in consequence of a violent exertion. Glandular swellings

Fig. 113.



again, if chronic, will probably have had their nature ascertained, and if recent, are usually connected with some source of irritation that leads to their recognition. It is important, however, to know that the glands *may* become suddenly large and painful in consequence of the strain from a violent effort, in which case sickness, vomiting and constipation, are not unfrequently induced by the irritation. Enlarged glands also occasionally exist along with a hernia, and render its diagnosis by examination extremely difficult, and even sometimes impracticable. In all cases of doubt, when other means fail in affording relief, it is the duty of the surgeon to cut down upon the swelling, and ascertain its nature. The symptoms of femoral are the same as those of inguinal hernia. But it is observed, that the bad consequences of strangulation are particularly severe and rapid in their progress, which is no doubt to be ascribed to the small size of the protruded portion of intestine, and the extreme tightness of the stricture.

The treatment of femoral hernia is to be conducted on the same principles which have been fully explained above. If it is reducible, a truss should be carefully worn afterward; and it is here even more necessary than in obviating the predisposition to inguinal rupture to fit the bandage properly. The cushion should be more convex, and it may be requisite to prevent its displacement upward by an addi-

tional strap passing round the thigh. When incarcerated, it should be subjected to the measures that favor reduction; and if it resists, must be prevented as much as possible from increasing by the compression of a suspensory bag. It may be observed, that femoral hernia is rarely met with in this state. Lastly, in case of strangulation, the taxis, together with its subsidiary means, if necessary, must be had recourse to without delay, so that no time may be lost in dividing the stricture, if this should prove the only resource.

In performing the operation it is generally better, on account of the smallness of the tumor, and thickness of the superjacent parts, to make, instead of a simple incision, one in the figure of the letter T. The transverse part of it should be as high as the neck of the swelling, that is, close to Poupart's ligament, and is most readily effected by lifting up a fold of the skin, together with as much as possible of the parts below that can be separated from the sac, and running a knife through it with the back turned toward the sac. The surgeon may then cut safely from the center of this incision downward, to the same depth with it. He next lays aside the two small flaps thus formed, and proceeds to expose the sac, by raising and dividing with the forceps and knife the layers of condensed cellular substance which cover it. If glands come in the way, they must be dissected off the hernia tumor; and when the sac is approached, the operator should be particularly careful to elevate the layer he wishes to divide at the fundus or most projecting part of the bag, as there is here most fluid between it and the inclosed intestine. In cases of femoral hernia requiring operation, the contents of the tumor are almost always recently protruded, and therefore seldom present those adhesions or other morbid alterations which frequently render the inguinal operation so embarrassing.

The direction in which the stricture should be divided has afforded fruitful subject of discussion. If the knife is carried upward, so as to cut through the crural arch, it must evidently endanger the spermatic cord or round ligament. This, therefore, which was the old operation, is decidedly objectionable. Gimbernat of Madrid observed (1793) that the stricture in femoral hernia on the pubic side of the neck of the sac was not situated, as had been erroneously believed before, at the tuberosity of the pubis, but at the distance of between one and two inches from it, and was formed by what is now called the crescentic margin of the crural arch. The attachment of the fasciæ to the bone, between this point and the tuberosity of the pubis, has been named Gimbernat's ligament, an appellation which, by conveying the idea of a distinct independent structure, has occasioned much confusion. Having ascertained this important anatomical fact, Gimbernat introduced a new method of relieving the stricture, which was to cut

inward from the neck of the sac toward the pubis. He operated very rudely, by passing a grooved director and bistoury between the intestine and stricture into the abdomen, and then separating them so as to make a very free division of the fasciæ, and thus endanger the bladder, or even the uterus if distended. The principle of the operation, however, being good, was adopted in practice, and would probably long ere now have been invariably acted on, were it not that, in *post mortem* examination of femoral hernias, the obturator artery has been found rising from the epigastric or external iliac and encircling the neck of the sac. This origin of the artery is now ascertained to be far from unusual, but there is reason to doubt that the vessel will often allow the hernia to protrude between it and the trunk from which it rises, so as to lie on the pubal side of the sac, and be in the way of the knife, and even though it were to be so situated, there seems little danger of cutting its coats in dividing the stricture, provided this part of the operation be properly performed. The tumor, which is generally very small, depends principally on fluid accumulated in the sac, and the portion of intestine subjected to strangulation is often no larger than the point of the finger; but even though it should equal in size a pigeon's egg, which it seldom exceeds, a very slight dilatation of the stricture is sufficient for permitting reduction.

Instead of the coarse and dangerous procedure of Gimbernat, therefore, the division of the tight edge of the fasciæ should be effected very gently and cautiously. The surgeon having introduced his forefinger into the sac close up to its neck, with the nail turned toward the intestine, feels for the crescentic margin of the fasciæ, or rather for its situation, since in cases requiring an operation, the stricture is too tight to permit the smallest part of the finger to be passed through. He then carries up a blunt-pointed slightly curved bistoury along his finger, toward which the flat side is turned, and carefully insinuates its point within the stricture, which being accomplished, he turns the knife so as to direct the cutting edge to it; and if sufficient dilatation is not thus obtained, he presses the edge of the knife on the tense fibers without using any sawing motion. As room is gained, he presses his finger gradually forward, until he feels that the point is fairly within the abdominal cavity, when he may be sure that enough has been done. It often happens that, immediately upon the return of the protruded viscera, a quantity of serous fluid escapes from the abdomen, which has an alarming appearance, but is not of the slightest consequence. The after-treatment of the patient should be conducted on the same principles which have been explained in regard to inguinal hernia. It may here not be improper to notice a question which has of late been agitated with considerable keenness. This is, whether in operating for hernia it is necessary that the sac should be

opened, and whether it would not be better to relieve the stricture without cutting into the cavity of the peritoneum. The advantage contended for in favor of the latter practice, is its lessening the risk of inflammatory consequences. In opposition to it, many strong objections readily appear—as in the *first* place, the difficulty, or rather impracticability of safely dividing a tight stricture without the assistance obtained from introducing a finger into the sac as a guide for the knife; *secondly*, the inefficiency of pressure to reduce the protruded parts, unless the orifice through which they have escaped, be rendered very free indeed, so long as it operates through the medium of fluid contained in a bag; *thirdly*, there is the fear of returning the sac along with the viscera, in which case strangulation may still be maintained by its narrow neck; *fourthly*, there is ground to believe, that the neck of the sac is in general much concerned in causing the strangulating constriction, so as to require division no less than the fascial stricture itself; and, *lastly*, there is the chance of returning the intestine in a state improper for reduction, or of being foiled in doing so from adhesions or other morbid changes, requiring free inspection, and the use of the knife for their removal.

[If we are compelled to operate, we should by all means, guard against the disposition to sink under the operation, for this is very often the case. In over sixty per cent. of the fatal cases there is peritonitis, and we should, as far as possible, guard against it.—R. S. N.]

UMBILICAL HERNIA.

Children are sometimes born with a malformation of the abdominal parietes, which exposes the peritoneum of the epigastric region to view, and allows the viscera to protrude, notwithstanding any pressure that may be employed to prevent them from doing so. Such imperfectly formed beings generally die soon after birth; and if they survive, must labor permanently under the inconvenience which attends the unprotected condition and displacement of their bowels; all that art can do being to afford some mechanical support, where the parietes of the abdomen are defective, by means of a firm case of leather or other suitable material. But, independently of this defective structure, the viscera may be protruded through the umbilical aperture, or passage for the vessels of the fœtus, the thin skin which is formed after the separation of the cord being distended by the sac of peritoneum. Such an occurrence can take place only within a short period after birth, since the umbilical opening subsequently becomes obliterated, and occupied by a firm unyielding cicatrix. Hernia occasionally appears in the adult near the umbilicus; but then it is always situated in a preternatural aperture, and is said to be Ventral. True umbilical hernia in the adult is always congenital.

In the treatment of this species of hernia, it is of great consequence that reduction should be effected and maintained while the aperture still retains its disposition to become obliterated, so that a radical cure may be effected, and the patient saved from the necessity of wearing a bandage permanently. In children where there is no malformation, and merely a relaxation of the umbilical opening, this may in general be easily accomplished, by returning the protruded vicera; then placing a conical-shaped compress, such as a nutmeg enveloped with lint, on the opening through which they passed; and, lastly, affording sufficient pressure by applying cross straps of adhesive plaster. This attains the object better than a circular bandage, which necessarily compresses the general cavity of the abdomen, and thus, though it counteracts the predisposition by strengthening the parietes, tends to excite the disease. In the slight degree of this complaint, usually met with in infants, which merely presents the appearance of a thimble-like protrusion from the umbilicus, it is not necessary to employ any means of treatment, as the parts soon assume a normal state through spontaneous contraction. In adults such simple measures are not sufficient, and more powerful pressure is required. The best apparatus for the purpose consists of two broad circular cushions, one of which is placed on the back, and the other opposite the seat of the hernia, which may be connected by a spring with any requisite degree of force. Additional security for this bandage can be readily obtained, if found necessary, by means of straps passed under the perineum, or brought over the shoulders.

Incarcerated and strangulated umbilical hernia should be treated on the same principle as those which have been explained. When the operation is judged requisite, a crucial incision should be made through the integuments, having the most prominent part of the tumor for its center, unless the hernia is very large, when it will be sufficient to make a simple incision, two or three inches long, at the base of the swelling, directed toward the center. The sac is to be exposed and opened in the same way that has been already described, and the stricture may be divided on any side, or, what is better, on several sides, so that no one is cut very extensively. The omentum is, in this situation, apt to cover the viscera, and ought to be carefully disengaged from them before being either cut away or reduced.

VENTRAL HERNIA.

What has been said regarding umbilical hernia, will apply, in all respects, to ventral hernia, with the exception that a radical cure is impracticable, and that, as the disease is almost exclusively confined to adults, some powerful means of compression are always required. Protrusions of this kind are not common, and when they do occur, are

generally situated in the *linea alba* near the umbilicus; but the records of surgery show that they may take place in almost every part of the abdominal parietes.

Hernia Dorsalis, or through the Ischiatic Notch, *Hernia* of the *Foramen Ovale*, and *Hernia* of the *Perineum*, are so extremely rare, that it does not seem necessary to detail the particulars of the few cases in which they have been observed. In a case of perineal hernia that came under my notice, the patient, a middle-aged female, made a narrow escape, from having the tumor opened instead of an abscess. The swelling was larger than a turkey's egg, and lay between the anus and tuberosity of the rectum.

ILIAC ABSCESS.

Collections of matter are sometimes formed in the iliac or inguinal regions, lying between the parietes of the abdomen and the peritoneum. As the gut on the right side is in this situation partly uncovered with peritoneum, there is a risk of ulcerative absorption being induced in its coats by the pressure of the confined fluid, so as to form a preternatural opening into the *caput cæcum*, which may become a stercoraceous fistula if the integuments also give way. To prevent this occurrence, it is right in such cases to make an early aperture. This complaint is met with most frequently in females soon after delivery, but is not confined to this condition; and I have even met with it, though certainly very seldom, in patients of the other sex. The abscess is generally of a subacute character, and, from its insidious formation, is apt to escape recognition.

[Among the various plans for reducing hernia, is that of Hill. The process consists in the use of a very large cup, so as to draw within it a considerable portion of the intestinal mass. The philosophy of this plan is apparent, and if the patient tries at the same time to lift his bowels, we may expect it to prove quite sufficient to effect what Hill calls the "spontaneous reduction." From the nature of the subject of hernia, I feel justified in lengthening out the remarks of Mr. Syme; for I am satisfied that too few surgeons have closely studied the subject.

When an operation becomes essentially necessary, the surgeon makes an incision through the skin, three or four inches in length, beginning above the neck and running along the course of the tumor (as indicated by the dotted lines, Figs. 112, 113). He then cuts through the successive layers before described, by pinching up a small bit at a time with the forceps, and cutting horizontally through it under their points. This process is repeated until an opening is made to the sac, which can always be distinguished by its bluish appearance. The sac itself is to be opened in the same manner by pinching up a little bit, and cutting

through it horizontally. The small director (Fig. 114) is then inserted and an opening made sufficiently large to admit a finger. The fore-

Fig. 114.



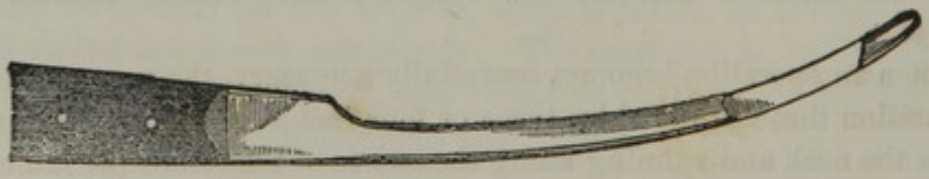
finger of the left hand is introduced (as shown in Fig. 115) and passed up to the neck of the sac to search for the stricture, which will generally be found at the internal ring; it may, however, be at the external ring; or there may be a stricture at each. The stricture is to be

Fig. 115.



dilated to admit the finger to enter the abdomen. This is done by what is called a probe-pointed bistoury, or a similar knife, made for the purpose, not edged quite up to the point, and only for a short space below it (Fig. 116). The blade is passed up *flat-wise* (see Fig. 117)

Fig. 116.



along the finger and pushed on through the stricture. Its edge is then turned upward, cutting no more than necessary to admit the finger. The CUT must, in all cases, be made DIRECTLY UPWARD, parallel to the linea alba, whether it be in Direct or Oblique Inguinal Hernia, so as to *avoid* the epigastric artery. If there be no stricture in the neck of the sac, one may be found in the body.

Fig. 117.



The stricture being thus relieved, and sufficiently dilated with the fingers, strict examination of the parts must be made; for, if firm adhesions have taken place, no attempt should be made at reduction; or if the protrusion has continued so long that fatty deposits around the part have accumulated to too great an extent, the hernia must be allowed to continue. All you can do in such a case, is to let the wound heal, taking precautions against inflammation. When the bowel has mortified, care must be taken not to disturb the adhesions at the neck. The intestine must then be opened, and the mortified part taken out. The only chance is then, that of an artificial anus.

For Femoral or Crural Hernia, the skin is pinched up and divided by a simple incision (as marked out in the case represented in Fig. 113), or, as many prefer, a crucial or angular one—the safest way of making it being to run a narrow knife through the skin, with its back toward the hernial sac. The superficial fascia of the thigh with its fat, and the fascia propria, must then be divided. Immediately beneath the latter and contiguous to the sac, may be another layer of fat, liable to be mistaken for omentum. The sac itself is usually very small, seldom containing omentum or serum; and must be cautiously opened, as it embraces the bowel very tightly. The stricture will generally be found at the inner edge of the falciform process. This must be slightly cut, for a line or two only, in an UPWARD and somewhat INWARD direction. If carried too far, the incision might penetrate the spermatic cord, or, in females (who are more liable to this form of hernia from greater breadth of pelvis) the round ligament of the womb. If that is not sufficient, a few fibers of Gimbernat's ligament are directed to be severed, although there is great danger of wounding the obturator artery, which often encircles this ligament. When the hernia is freed, reduction is to be effected as directed in the former case.*

The main object of the surgeon in treating hernia should be to effect a radical cure. The irritating plaster is to be applied over the sac, as recommended by Morrow. The hair should be shaved off and a plaster

* Eclectic Surgery.

applied large enough to cover the whole sac. Over this plaster the truss, after the hernia has been reduced, should be placed; but, in a short time the part will become too much inflamed and irritated to bear the pressure of the truss, when a large compress must be substituted for it. Keep the plaster on until the irritation becomes troublesome, when it must be removed and the part dressed with a common elm poultice. The patient is to lay on his back as much as possible, and his bowels kept open. The following plan of M. de Boubaix, for effecting a radical cure, will be found every way worthy of the attention of the profession:

"The hernia having been reduced, and the integument being pushed into the orifice, the operator seizes that portion of the skin which lies immediately over the spermatic cord and femoral vessels, so as to form a vertical or slightly oblique fold; this fold is raised as much as possible, its base is transfixed with a straight bistoury; and it is cut through from behind forward. From the extremities of this incision two others are made, of a semilunar form, with their concavities looking toward each other, and approaching each other toward the upper part of the hernial orifice, leaving a sufficient space for the nutrition of the flap. The flap is introduced into the orifice so as to form a plug.

The edges of the ring and of the skin have now to be united. To effect this, M. de Boubaix draws firmly together the edges of the incisions and the neighboring skin; then, the left index finger or small gorget having been introduced into the transverse aperture, the integuments and the aponeurosis are connected by means of a small trocar. He then introduces through the canula a piece of platinum wire fitted to receive a small screw at each end. If convenient, a second platinum wire may be introduced. An oval piece of gutta-percha, with a small hole in the center, is passed on each side over the wire, so as to come in contact with the skin. The pieces of gutta-percha are then drawn together by means of the screws. In this way a longitudinal wound is obtained, the edges of which are brought into apposition by the twisted suture, care being taken to leave the lower part free for the escape of pus.

The advantages of this procedure, according to the author, are:

1. The hernial sac being untouched, and the lesion of continuity affecting only the skin and aponeurosis, there is no danger of peritonitis.

2. There is no danger of injury to the spermatic cord and femoral vessels.

3. The cutaneous flap, having its pedicle upward, is not liable to be drawn downward either by the weight of the scrotum and testis, or by the movements of the thigh.

4. The henial orifice is narrowed and partially obliterated, and in

front of it is placed a powerful obstacle which adheres to and fortifies it.

5. In front of the vessels and cord there is a firm cicatrix, which, by its connection with the plug and the adjacent parts, forms an impassable barrier to the viscera.

M. de Boubaix has performed this operation successfully on a female aged sixty-one, who has suffered for twelve years from a large femoral hernia, which descended as far as the patella." *

A variety of plans have been suggested, but this is the best I have yet seen.—R. S. N.]

CHAPTER XX.

PELVIS.

IMPERFORATE ANUS.

Deficiency or imperforation of the anus is a congenital disease, and exhibits several varieties which must be distinguished in practice. Sometimes the rectum is completely formed, with the exception of having its orifice closed by a thin membrane, which allows the dark color of the meconium to be discerned through it. This obstruction, instead of existing at the extremity of the gut, may be situated a little above it, so as to require the introduction of a finger or probe for its discovery. The rectum is also occasionally found to be deficient at its lower part, becoming nearly or altogether impervious at the distance of an inch or more from where the anus ought to be. In such cases, there is not unfrequently a communication between the intestine above the obstructed part and the vagina of the female, or the urinary bladder of the male, the former of which complications has sometimes proved sufficient for affording passage from the bowels during the course of a long life.

The symptoms of imperforate anus are swelling and tension of the abdomen, vomiting, and absence of the usual evacuations from the bowels. If the child is not relieved by having an aperture effected for the escape of the confined feculent matters, it must speedily perish; and an examination of the rectum should, therefore, be always instituted without delay, when there are symptoms indicative of obstruction, and more especially when there is no discharge of meconium.

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* Association Med. Journal, January, 1856.

In case of simple closure, without deficiency of the gut, the membrane should be punctured, and then freely divided in a crucial direction with a probe-pointed bistoury or scissors, guided on the finger. To prevent contraction of the wound, it will be necessary to introduce daily, until the cure be completed, a large tent of lint or cotton, smeared with some unctuous matter. If there is no appearance of an anus, and the lower part of the rectum is wanting, the prognosis must be very unfavorable, since such a malformation is usually associated with other imperfections of the system; and, though it should not be so complicated, is remedied with great difficulty, as the opening made by incision through the integuments and subjacent tissues, even if it reaches the rectum, and suffices, in the first instance, for allowing the evacuations, is very apt to contract, or become almost obliterated, notwithstanding every care that can be taken to prevent it from doing so. The child should be placed upon its back, and have its thighs held up so as to expose the parts fairly to view. The surgeon then makes an incision about an inch in length in the mesial plane, having its posterior extremity about half an inch distant from the *os coccygis*. Making way with the knife, he introduces his finger in the direction of the hollow of the sacrum; and if the gut is near, he will discover it by the fluctuation of its contents. If he succeeds in puncturing the coats of the intestine, the opening is to be enlarged to a suitable extent, and prevented from closing by the introduction of a tent. But if he fails in finding the gut within the distance of at most two inches from the surface, he need not prosecute the search farther. In cases where a communication exists between the rectum and bladder or vagina, assistance may be derived in discovering the obstructed extremity by introducing a director through the preternatural passage into the cavity of the intestine. There are some cases on record in which life has been preserved for a time by cutting into the *caput cæcum* in the right iliac region, or into the bladder through the perineum; but such desperate attempts can hardly be recommended.

STRICTURE OF THE RECTUM.

Stricture of the rectum sometimes, but very rarely, exists as a congenital imperfection, and almost always depends upon changes in the structure of the coats of the intestine taking place in the progress of life, especially during its middle and later periods. Like stricture of the esophagus, it may be caused either by simple contraction, with thickening and induration of the gut, or by morbid degeneration of its constituent tissues, in which case the resulting tumor is usually of a carcinomatous nature.

The symptoms of simple stricture are slow, painful, and imperfect evacuations of the bowels; the desire to empty the rectum continuing

after the most powerful and prolonged efforts of expulsion; the discharge of fluid matters with great force, as if from a squirt; the appearance of the solid evacuations in the form of slender cylinders, or small round masses; and the admixture of a large quantity of mucus, often bloody, with the feculent excretions. The disease generally manifests itself very insidiously, and before long is usually accompanied with a distended state of the abdomen, which is owing partly to retention of the intestinal contents, and partly to a tympanitic condition induced by the irritation. The desire to empty the bowels becomes at length almost incessant, and the frequent attempts which are made to do so being seldom followed by any evacuation except of fluids, there is a risk of erroneously supposing that the patient labors under diarrhea, and with this view of prescribing astringent, or other kinds of constipating medicines which have a tendency to increase the distension of the intestine. In all cases of doubt, an examination should be made with the finger or a bougie, to ascertain positively whether or no there be a stricture. It is generally found about two inches or two inches and a half distant from the orifice, but may be situated much higher up.

The greatest tact and dexterity cannot ensure even a moderate approach to certainty in exploring the width of a canal so capacious and loosely connected as the upper part of the rectum and the sigmoid flexure of the great intestine, as the coats are extremely apt to be pushed before the point of the bougie, and in different circumstances lead to the belief that there is a stricture when there is none, or that there is no contraction when it actually exists. It is often erroneously supposed that a stricture exists about five or six inches up the gut, owing to the resistance caused by the promontory of the sacrum to the introduction of a bougie. The difficulty of obtaining satisfactory evidence as to the existence of stricture in these situations is the less to be regretted, as it is almost always seated within reach of the finger, which cannot be deceived; and if beyond this extent may be deemed quite irremediable. Unless the patient be relieved, general emaciation is gradually induced by the continual distress, and derangement of the intestinal functions. Hectic irritation follows, and death may be the ultimate effect, either from gradual exhaustion, or from inflammation of the bowels. The progress of the disease is usually very slow, and years may elapse before the symptoms are sufficiently severe to excite attention, their insidious approach rendering the patient unaware of their presence, even when distinctly marked. In carcinomatous contraction of the rectum, the patient suffers the symptoms which have been described, and also those attendant upon that kind of morbid degeneration, viz: lancinating pains, not constant but severe, an almost cartilaginous hardness of the rectum, which is felt if the finger be

introduced to the diseased part, and frequently extends to the skin surrounding the anus; also, when the disease has advanced to the ulcerated stage, a fetid sanious discharge from the anus, together with involuntary evacuation of thin feculent matters. In females, a communication with the vagina is often established, and allows the contents of the bowel to escape by it. The appearance of the patient further characterizes the nature of the case, being thin and cachectic-looking, and exhibiting the greenish-yellow complexion usually observed in persons laboring under malignant disease.

In treating simple stricture of the rectum, if it should appear that the contraction depends on congenital malformation, which it is important to know sometimes escapes observation until an advanced period of life, the best course is to divide the constriction freely with a knife, and afterward interpose dressing sufficient to prevent immediate closure of the wound or its subsequent contraction. But if the stricture be the result of diseased action in the coats of the gut, which has caused thickening and induration of them, the best remedy consists in the introduction of bougies successively increased in size, which by inducing interstitial absorption in the parietes of the intestine, gradually restores them to a natural state. Bougies, for this purpose, are employed of various materials, such as steel, elastic gum, wood, and glass. The first two are the best. They should be slightly curved to facilitate their entrance into the rectum, and, if metallic, have a bulging extremity to render their passage through the stricture more distinctly perceptible. Before being used, they ought to be heated by immersion in warm water, and anointed with some unctuous substance. There is no advantage in allowing them to remain for any length of time after being introduced. They should, therefore, be immediately withdrawn, and ought not to be employed again before an interval of three or four days. Cancer of the rectum is no less incurable than in other situations, and of course, could not be excised without inflicting a mortal wound, unless of small extent, and confined to the verge of the anus; all, therefore, that can be done for the patient in such unhappy circumstances, is soothing the irritation of the disease by opiate injections, the hip-bath, and gentle laxatives.

The rectum, like the esophagus, which it resembles in many points of structure, function, and morbid derangement, is liable to stricture of two different kinds. In one of these there is merely contraction of the coats, with thickening and induration of their texture. But in the other there exists a morbid growth, attended with the symptoms, and prone to the changes, which characterize malignant degenerations of structure. Want of attention to this very obvious and necessary distinction has led to great misapprehension in regard to the nature of the disease, and serious errors of practice in its treatment. By some

it has been looked upon as always admitting of remedy at an early stage, and by others it has been considered always incurable; while the good effect of introducing bougies in cases of the simple or non-malignant kind has encouraged those who supposed the stricture to be constantly of a carcinomatous nature, to expect benefit from the employment of pressure in the treatment of cancer occurring in other parts of the body.

SIMPLE STRICTURE OF THE RECTUM.

The simple stricture is seated very near the lower extremity of the rectum, a little within the sphincter, about two inches or rather more from the anus. It is here that the gut changes the direction of its course, and after following the curvature of the sacrum, makes a sudden turn outward to its termination. There is thus formed a sort of angular projection by the posterior surface of the bowel, which may be supposed likely to increase when subjected to continued irritation of any kind, and at length to constitute an inconvenient degree of contraction. It has been maintained that this is not the sole seat of stricture in the rectum, and that the disease frequently occurs farther up the canal, especially at the distance of five or six inches from the anus. Indeed, some have gone so far as to profess their ability not only to recognize, but to treat it successfully when seated beyond the rectum altogether, in the sigmoid flexure of the colon. That contractions of the great intestine may occur in any part of its course, I do not mean to question. But that the thickening and induration of its coats are in such cases usually confined to the narrow limits which constitute a stricture, in the ordinary acceptation of this term, or that the strictured part, when so situated, can ever be accurately ascertained, and efficiently dilated by the use of instruments, I have no hesitation in expressing my unqualified disbelief.

It is very natural for persons suffering from constipation to suppose that obstruction of the bowel is the cause of their complaint; and they are consequently ready to believe in the existence of stricture, when it is intimated to them by their medical attendant, especially if, at the same time, hopes of relief are held out from the employment of mechanical treatment by dilatation. There is too much reason to fear that unprincipled practitioners have taken advantage of this facility in the disposition of their patients to promote their own unworthy views. But I should be sorry to allege, that either the supposed discovery or the treatment of strictures high up the rectum necessarily implied a want of good faith; since the practitioner is hardly less exposed to deception than the patient; and if he examine the rectum, under an impression that there is a stricture existing in it, he will be very apt to believe that he has found one. In the feeble and unhealthy persons

who are usually suspected to labor under the disease, the coats of the rectum are so thin and relaxed as readily to catch the point of the bougie employed for exploring the cavity, and thus impede its progress, which is also apt to be arrested by the promontory of the sacrum. As an instance of this, I may mention the case of an elderly lady whom I saw with Dr. Begbie. She had been supposed to suffer from stricture of the rectum, between five and six inches up the gut, and had been subjected to treatment for it during several years before coming under Dr. Begbie's care, by two gentlemen of the highest repectability in this city. Finding that the coats of the rectum, though greatly dilated, were quite smooth, and apparently sound in their texture, so far as my fingers could reach, and conceiving that the symptoms of the case denoted a want of tone or proper action, rather than mechanical obstruction of the bowels, I expressed a decided opinion, that there was no stricture in existence. Not many months afterward the patient died; and when the body was opened not the slightest trace of contraction could be discovered in the rectum, or any other part of the intestinal canal. One of the gentlemen who had been formerly in attendance was present at this examination; and wishing to know what had occasioned the deception—which he said had led to more than *three hundred hours* being spent by himself and his colleague in endeavors to dilate the supposed stricture with bougies—he introduced one as he had been wont to do, and found that, upon arriving at the depth it used to reach, its point rested on the promontory of the sacrum. Other cases might be mentioned to illustrate the uncertainty of information as to the capacity of the higher part of the rectum, obtained by exploring the gut, and to show how far the best-intentioned practitioners may be misled by the sources of fallacy I have endeavored to explain.

If the symptoms of stricture of the rectum could be traced at an early stage of the disease, difficulty in evacuating the contents of the bowels would probably be their most remarkable feature. But the complaint almost steals on insensibly, so as not to attract attention until fully formed; and then the inconveniences experienced are so different from what might be expected, that they tend rather to obscure than to indicate the nature of the complaint, which is therefore seldom suspected by the patient. There was, in the hospital here, a woman admitted on account of a *fistula in ano*, in whom, in introducing my finger into the rectum, to guide the knife in dividing the septum, I found a stricture in the ordinary position, so tight as to exclude anything larger than a moderate-sized urethra bougie; yet she had been quite unconscious of its presence, though the symptoms proceeding from it were extremely severe. The reason of this is, that the effects of a confirmed stricture are in general the frequent, often almost

incessant discharge of thin feculent matters, owing to the copious secretion of mucus which results from the irritation of the disease; and that the thin slimy stools, occasionally tinged with blood, attracted more notice than the small indurated masses of fæces passed along with them, make the case assume the appearance of diarrhea. The mistake thus committed not only prevents the proper means of remedy from being employed, but leads to the administration of astringents and anodynes, which must prove hurtful, by checking the process instituted by the system for its own relief. This consists in the copious secretion of fluids into the cavity of the great intestine, which lessens the solidity of the feculent matters, and facilitates their passage through the narrow channel remaining for their escape. Being forced down upon the stricture by the violent efforts to unload the distended bowels, a small quantity is urged through the stricture, and issues from the anus in a sudden jet, as if propelled by a squirt. The chief character of the disease in its advanced stage, then, is the frequent squirting out of thin feculent matters, containing no solid masses, or only very small ones, and mixed with blood or mucus, accompanied by a sensation of cutting or burning in the rectum. In addition to this the abdomen is distended, partly by retention of its feculent contents, partly by tympanitic swelling, caused by derangement of the bowels. Pain also is felt in the sacrum, extending down the limbs; and abscesses frequently form in the vicinity, so as to lay the foundation of *fistula in ano*. In this case the sinus does not, as has been alleged, open into the gut above the contracted part, but holds its usual position near the anus, and should be regarded rather as an accidental consequence of the neighboring irritation, than as a direct effect of the stricture.

The disease is met with more frequently in females than males, and generally occurs about the middle period of life. It is extremely distressing, and if not remedied may at length prove fatal, by gradually exhausting the patient's strength, or exciting inflammation of the bowels. Some years ago, I attended a gentleman for *fistula in ano* together with stricture of the rectum. Not long afterward he told me that his wife complained of symptoms similar to those he had suffered from the latter ailment. I proposed an examination of the rectum, which was declined, and I heard no more of the patient, until raised one night by an urgent request to visit her immediately. She was laboring under the symptoms of peritonitis in its advanced stage, and died before the end of many hours. The rectum was contracted almost to obliteration at the usual part. Instead of terminating thus abruptly and violently, the disease more frequently, when it proves fatal, gradually exhausts the strength of the patient, by the continued uneasiness and derangement of the digestive functions which attend it. Extreme emaciation and hectic irritation are thus induced; and unless some

other disorder occurs to arrest his sufferings, he at length sinks under the complaint. The progress of such cases is by no means rapid; and the disease after attaining a certain extent often seems to remain stationary; so that there is usually ample opportunity for its discovery and treatment.

From the slow and insidious formation of stricture in the rectum, it is not easy to ascertain the circumstances which give rise to it. The analogy of what happens in other mucous canals would lead to the supposition that continued irritation of the gut is probably the immediate exciting cause. But the precise way in which this state is occasioned, or why, when its other effects are so common, it should so rarely produce the effect in question, are points that have not yet been satisfactorily made out.

In the treatment of the disease some temporary relief may be derived from injecting tepid water or oil into the rectum, to soothe the irritation of its coats, and facilitate the discharge of its contents. But as the patient cannot be freed from his complaint by such means as these, it is necessary to inquire how the gut may be restored to its natural capacity. Of the means employed to remedy strictures of mucous canals in general, namely, the caustic, the knife, and the bougie, the last two mentioned have alone been resorted to in treating stricture of the rectum. Division of the contracted part with a cutting instrument, notwithstanding the obvious risk of hemorrhage and inflammation incurred by doing so, has been occasionally practiced; and with such speedy as well as complete relief, that some practical writers regard this method as the one which ought to be preferred. But experience having ascertained that, in certain conditions of a constitutional and local kind, wounds of the rectum, even though of very small extent, are followed by serious or fatal consequences; and as the bougie, though not so speedy in its operation as the knife, being in general equally effectual, and not exposed to the same objection, prudence seems to require that the practice of incision should be either entirely abandoned, or only used in particular cases with extreme caution. The best instrument for this purpose is the blunt-pointed curved bistoury; and the stricture should be either divided backward, in the direction of the sacrum, or notched at different parts of its circumference by cuts of smaller extent. A young lady was brought here in a state of great exhaustion from the severe and protracted suffering caused by stricture of the rectum. It had been dilated by bougies without any relief, and when I saw her, had contracted to the size of a quill. Large quantities of mucus were discharged—and fistulous communication with the vagina had recently taken place. In these circumstances I considered myself warranted to employ incision, and

did so with the effect of completely removing the local complaint and restoring the general health.

The use of bougies in removing strictures is a remarkable example of good practice, originating from false principles. It was at first adopted with the view of destroying obstructions of the unrethra through the effect of medicinal substances, which were in this way applied to the contracted part of the canal. And when experience had proved that bougies of the simplest composition, as those constructed of metallic substances, were not less effectual than those of the medicated kind, the process of improvement was next ascribed to the dilatation acting merely mechanically as on a tube of dead matter. Hence it was thought impossible to introduce the instruments too frequently or for too great a length of time. At least once a day was thought essential; and they were permitted to remain for hours at a time. But the contracted canal is not composed of dead substance, and the stricture depends upon a peculiar morbid action of the living texture. The beneficial effect of the bougie, therefore, must consist in the excitement of another action opposed to the one formerly in operation, and capable of restoring the gut to its natural state.

It is the effusion of organizable matter into the cellular texture of the part that causes the stricture, and it is the absorption of this deposit which removes the disease. The bougie by effecting pressure excites the action of absorption. And if the pressure be too great, too long continued, or too frequently repeated, there will be a risk of causing more than sufficient irritation for the purpose, and of inducing again the very condition it is employed to counteract, the consequences of which must be a confirmation and increase of the disease. The perfection of treatment by means of the bougie may thus be considered to consist in using it merely to the extent requisite for producing its beneficial effects; and this is now fully ascertained to be much less than might at first view have appeared possible. Instead of requiring to be introduced daily, and to remain in the passage for hours, it appears that the bougie causes a sufficient degree of excitement if used every third or fourth day, and withdrawn immediately after being passed through the stricture. Under this system the improvement not only advances at least as quickly as when the operation is performed more frequently, but it is likewise much more sure in its progress, and much less apt to be interrupted by an undue irritation of the part concerned. These principles now regulate the treatment of stricture in all the mucous canals which are subject to it, namely, the urethra, esophagus, and rectum.

Rectum bougies are constructed of various materials; and from the facility of guiding them through the stricture, owing to its position in the vicinity of the anus, the composition of the instrument is of less

consequence, than when the disease is seated in the urethra or œsophagus. Metals, wood, glass, and cloth made up with plaster or elastic gum may be employed. But, on the whole, those formed of iron and elastic gum are the most convenient. The former are cheap and imperishable, the latter are more expensive and liable to decay, but perhaps more easily introduced and less hurtful to the feelings of the patient.

When the operation is to be performed, the patient should be placed upon his side, and then the surgeon, having in the first place satisfied himself as to the precise condition of the stricture, by feeling it with his finger, passes a bougie lubricated with oil or lard up to the obstruction, and presses against it steadily but gently. If the resistance cannot be overcome without using force or causing pain, he withdraws the bougie, and tries a smaller one in the same way, thus proceeding until he gets one to pass through the contraction, immediately after which, he withdraws it, and concludes the process for that time. If necessary, some soothing means, such as an opiate injection, or the hip-bath, may be employed to allay any undue irritation that has been excited even by this cautious proceeding. At the end of three or four days, or a longer interval, if the patient continues to suffer from the former operation, the bougie which was introduced upon that occasion is again passed, and followed up by another of larger size, and thus the treatment is carried on until the disease ceases to occasion any inconvenience, and a full-sized bougie can be introduced with ease.

MALIGNANT STRICTURE OF THE RECTUM.

There has been some difference of opinion as to the comparative frequency of simple and malignant stricture of the rectum; but from my own observation, I should say the latter is, out of all proportion, more often met with than the former. It generally occurs in the same part of the gut as the simple stricture, but is not so limited or regular in its extent. The diseased growth is sometimes confined to one side of the gut, at others it affects the whole circumference; and it is only in the latter case that there is stricture properly speaking, though it is usual to designate by this title all morbid growths occurring in the coats of the rectum. The swelling is usually of a very irregular form, and seldom extends less than several inches along the gut. Occasionally, it descends quite to the anus, or even shows itself externally, so as to simulate a pile, for which I have often known it mistaken and treated; but more frequently it leaves the coats of the intestine free for an inch or two within the sphincter. The morbid growth generally possesses a moderate degree of firmness, and exhibits characters intermediate between those of carcinoma and medullary sarcoma. It encroaches on the cavity of the rectum, so as to impede, more or less,

the evacuation of the bowels, and being attended with the symptoms which are wont to proceed from degenerations of a malignant kind, occasions great and almost unceasing distress. The patient complains of a shooting or fixed dull pain in the back, at the upper part of the sacrum, and extending down the limbs, together with a sense of weight and uneasiness in the part affected, especially after evacuation of the bowels, or the operation of any circumstances causing irritation of the disease. He passes blood and purulent matter along with his stools, which are thin and frequent; and though in the early stage of the disease difficulty may be experienced in passing them through the thickened coats of the gut, there is for the most part ultimately rather an inability of retention from the action of the sphincter being impeded by the progress of the disease. His countenance displays the greenish-yellow complexion characteristic of malignant disposition in the system, and he loses flesh as well as strength. On examination, the gut is found not only contracted, but thickened and irregular on the surface. The coats at the affected part are hard and unyielding, and the morbid growth is felt projecting into the cavity, sometimes in the form of rounded tubercles, at others rough with ulcerated depressions. As these changes, judging from touch alone, may not differ except in degree from those which attend the simple stricture, it would sometimes be difficult to determine the nature of the complaint merely by local examination. But the symptoms which accompany it are so well marked, that the disease can hardly be either overlooked or mistaken. In its progress the patient becomes generally exhausted, and falls into a hectic state, which is soon followed by dissolution.

In common with other malignant affections, carcinomatous stricture of the rectum does not admit of being remedied by any kind of treatment directed with the view of restoring the diseased part to its natural state; and its situation forbids any prospect of benefit from removal by the knife or other means.

In these circumstances, palliation is all that can be reasonably attempted; and for this purpose opiate injections with the hip-bath are very useful. The patient should be enjoined to abstain from every kind of stimulating food and drink, and also to avoid any exertion of body likely to aggravate the complaint, resting as much as possible in the horizontal posture. The introduction of bougies, and all other operations not only can do no good, but must ever produce an injurious effect, by increasing the irritation of the disease, and accelerating its progress. It appears that a considerable portion of the rectum, even to the extent of a couple of inches, may be cut out without any very serious bad consequences in the first instance. But the patient can experience no benefit from this being done, and, in addition to the pain of the operation, must have an impulse given to the morbid

action; so that if there are any cases in which this excision of the rectum has been followed by a permanent cure, the disease could not have been of a malignant nature. It may seem unlikely that so severe a proceeding should ever be resorted to except in cases the most hopelessly incurable by other means. But, so far from this, however startling and incredible it may appear, the fact is, that removal of the extremity of the rectum has been taught and practiced as the best mode of treating those hemorrhoidal affections which are generally comprehended under the title of *prolapsus ani*. That a complaint which, as has been shown above, may be certainly remedied with little pain, no danger, and without any injury to the natural structure, should be thought to require an operation so dreadful in its performance and effects, as cutting out the end of the bowel, together with its sphincter, is to be deeply regretted as well for the credit of surgery as the good of humanity. It is needless to say that, after this extirpation has been performed, the healing of the wound is attended with an extreme contraction, I have heard even obliteration of the gut; and the patient must consequently, like the victims of the ancient operation for fistula, suffer from the united miseries of constipation and incontinence.

It is possible that cancer may occur at the verge of the anus, as it does in the somewhat similar texture of the lip, and then excision may be practiced without any impropriety. But cases of this kind are extremely rare, and should be carefully distinguished from those in which the coats of the bowel are implicated, where the knife can never be prudently or beneficially applied.*

FISSURE OF THE ANUS.

There is probably no disease of the human body that gives rise to so much uneasiness in proportion to its extent, or admits of remedy with so much certainty and upon terms so easy as the one now to be considered. Although well described nearly half a century ago by the distinguished French surgeon, M. Boyer, it has only of late years attracted much notice in this country; and is still by no means so familiarly known either as to its diagnosis or treatment as might be desired.

The disease is usually met with in people between twenty and fifty years of age. It consists of a small ulcer scarcely exceeding half an inch in length and about a line in breadth, seated between the folds of the skin which surrounds the orifice of the rectum. The morbid surface being of such limited extent and lurking so deeply cannot be brought into view except by expanding the anus. In ordinary cir-

* Diseases of the Rectum, 1854.

cumstances this may be done without any difficulty, but when a fissure exists it is impeded by two embarrassing obstacles. For, in the first place, the superficial fibers of the sphincter are strongly contracted by the irritation of the ulcer, so that the orifice, instead of presenting a conical hollow, appears like a minute perforation on a flat surface; and secondly, there is generally a small firm red colored pile, like a pea in size and form, at the base or outward extremity of the fissure, which tends not only to conceal the sore, but to render its exposure more painful. To a practiced eye, indeed, the peculiar form, consistence, and color of this little swelling, render it a good guide to the seat of annoyance; but it much more frequently misleads to the idea that there is no local complaint, or only an external hemorrhoid. In some rare cases the ulcer is seated altogether within the sphincter, and then can be recognized only by means of a speculum or experienced finger, which detects it by the same sort of sensation that is experienced by pressing upon a button hole, from the base and margin being always thickened and indurated, so as to render the sore distinctly perceptible notwithstanding the small extent of its surface.

In both of these situations, the disease gives rise to nearly the same symptoms. There is always acute sensibility of pressure, which renders every attempt at examination extremely painful—in irritable persons causing an approach to syncope or convulsion, and upon all occasions eliciting expressions of intense suffering. Evacuation of the bowels is attended with pain, generally not so severe at the time as a short while afterward, when it becomes very distressing and acute for half an hour or more. There is frequently a discharge of blood and mucus along with the feculent matter, but not in any large quantity. Sitting is painful, and the patient may be noticed to rest with one hip on the corner of his chair, so as to protect the anus from pressure. Uneasy sensations are often experienced at a distance from the part affected; especially shooting down the limbs, so as to simulate sciatica or rheumatism, and causing symptoms of urinary irritation so strongly marked as to remove all suspicion of the rectum being the seat of disturbance. In many of the cases that have fallen within my observation, the disease had thus escaped detection; and I have met with patients who, during a long course of years, had sought in vain for relief throughout the great cities of Europe—being treated for irritation of the bladder or urethra, while their complaint depended upon fissure of the anus, or ulcer of the rectum. There are few occasions on which the exercise of surgical art is more satisfactory than the instantaneous and complete remedy of such cases by the simple and gentle means immediately to be mentioned.

The causes concerned in the production of fissure are very obscure. It seems most probable that some accidental laceration or abrasion of

the lining membrane lays a foundation for the disease; and that such may be the mode of production is proved by the occurrence, very rare, it is true, of fissures presenting the most characteristic features after operations for the removal of hemorrhoids. But whether a mechanical lesion be essential as an exciting cause, or is only partially and occasionally concerned in their establishment, remains to be ascertained.

In the treatment of fissure all sorts of applications, whether soothing or irritating, have been found unavailing, and from Boyer downward it has been a settled principle that incision affords the only effectual remedy. But the extent of incision really requisite is very different from that formerly recommended. Boyer, supposing that the spasmodic contraction of the sphincter was the obstacle to recovery, considered complete division of the muscle necessary. After suitable preparation of the patient he guided a straight bistoury upon his finger into the rectum, and then cut through "the coats of the intestine, the sphincter, cellular texture, and integuments." The wound was stuffed and not dressed again for several days. It healed, he says, generally by the end of a month or six weeks, but sometimes required two or three months before cicatrization was perfectly effected. Instead of this very severe procedure, I am warranted by ample experience to state that it is sufficient to cut through the fissure in its long direction, and as the ulcer does not affect any other texture than the mucous membrane, thus limit the incision to this membrane. The best instrument for this purpose is a sharp-pointed curved bistoury, and the most certain mode of employing it to attain the object in view, without cutting more than enough, is to transfix beyond the base of the ulcer, so as to cut through it inward upon the finger previously introduced as a guide. This little operation is neither difficult nor painful. It does not cause the loss of more than a few drops of blood, and the wound, as it requires no dressing, heals in the course of a few days.

SPASMODIC STRICTURE OF THE ANUS.

The derangement known under this title, which is perhaps not very correctly applied, consists in a permanently contracted state of the sphincter, or rather the external part of this muscle which lies immediately below the integuments. The skin surrounding the orifice is in consequence so drawn together, that, as I have mentioned with regard to the condition connected with the presence of a fissure, there is no longer the conical hollow usually perceptible as a sort of vestibule leading to the bowel, when the nates are held aside; but in its stead a flat surface, having in the center a small perforation, of which the lip is firmly closed. If the finger by gentle efforts be gradually insinuated through the anus thus altered it feels a strong compression in the seat of the external sphincter, as if inclosed in a ring of India rubber

on the stretch—and in addition to this permanent force an occasional increase of tightness from a spasmodic action of the muscle, the patient at the same time complaining of excessive pain.

If the contraction exists, as it generally does, along with fissure of the anus, it aggravates the symptoms of that complaint by causing pressure on the ulcerated surface. But, though not thus complicated generally, it gives rise to nearly the same symptoms, and as the disease is still more apt to escape detection when it exists in this simple form, the amount of misery admitting of easy and effectual relief, that is endured, especially by patients of the female sex, could hardly be imagined by any one not practically acquainted with the subject. There is also occasionally much difficulty experienced in effecting evacuation of the bowels, which, when felt by the patient as if about to be accomplished, is all at once prevented by an insuperable resistance. By means of injections into the rectum, if they can be introduced, which is not always the case, and the use of medicines that produce watery stools, some degree of benefit may be obtained, but there is of course no complete relief so long as the constriction remains.

This contracted state of the sphincter is so generally associated with fissure of the anus, that it has usually been regarded either as the same or an effect of that disease. The latter of these views seems the more reasonable of the two, and agrees with the important fact, that when the morbid conditions in question exist together, curing the fissure often relieves the stricture. But the muscular contraction is not unfrequently met with independently of any other ailment, and must therefore admit of being established without the influence of local irritation. After the operation for hemorrhoids, spasmodic stricture sometimes occurs in its most perfect form, even when there has been formerly very large protrusions, and apparently an almost complete want of muscular power, and it is therefore necessary to beware of treating with inattention any complaints suggesting such a change having taken place, however unlikely it may seem to be.

Dilatation of the contracted sphincter is extremely painful, and if carried on by the persevering use of bougies or other means, does not afford the slightest relief; as the muscular ring, however much expanded, when freed from the distending influence, immediately resumes its former straightness. While the ordinary treatment of stricture proves thus inefficient, it is fortunate that another mode of proceeding affords instant and complete relief. This consists in dividing the contracted fibers of the muscle, which may be done most easily by introducing a bistoury beyond the contracted ring until it reaches the finger placed within the anus, and then withdrawing the blade through the orifice. The incision requires to be of very moderate extent, hardly exceeding an inch either externally or internally, and should be made at one side,

toward the tuberosity of the ischium. A piece of dry lint may be inserted, between the edges of the wound to prevent bleeding, and then any simple dressing applied to the surface will be sufficient until cicatrization is completed. A bistoury, introduced upon the point of the finger, and carried outward to a sufficient distance, will also attain the object in view, but not so conveniently and certainly.*

FOREIGN BODIES IN THE RECTUM.

Foreign bodies are introduced into the rectum, either by descending through the intestinal canal, or by being forced through the anus. They are prevented from escaping by their size or shape, or by both of these circumstances. Concretions of indigestible matters, swallowed along with the food, or indurated masses of the ordinary feculent substance, may obstruct the gut. Fish bones and other hard bodies of a spicular form, after passing through the whole length of the intestines are sometimes detained by the *sphincter ani*. Pieces of wood, glass, earthern-ware, and other matters, have been accidentally lodged in the rectum, by patients endeavoring to procure evacuation of their bowels, and still more rude articles have been forced into it in consequence of falls on the breech. The symptoms, of course, vary with the bulk and figure of the foreign body. If it merely obstructs the passage, the patient suffers only from constipation, together with more than usual uneasiness and sensation of weight in the region of the rectum, and if the coats of the gut are punctured or lacerated, the additional symptoms of bloody mucus, or blood discharged by stool, and pain more or less acute, will indicate the nature of the case. But the only method of acquiring certain information as to the state of matters, is to make an examination with the finger, and this ought always to be done when there is any reason to suspect the existence of a local cause of irritation or obstruction in the rectum.

For effecting the removal of foreign bodies from the rectum, different means must be employed, according to the circumstances of the case. Feculent masses should be softened by repeated injections of soap and water; after which they are, if possible, to be broken down with a scoop, the handle of a spoon, or forceps, or, if this cannot be effected, extracted entire by the same means. Hard, pointed substances are best withdrawn by straight or slightly curved forceps, guided with the finger so as first to dislodge, and then extract them. If they cannot be got out entire, another pair of forces should be employed to break them into fragments, while the principal portion is held steady with those first introduced. When the difficulty proves extreme, it will be much better to make a free division of the integu-

* Diseases of the Rectum, 1854.

ments and sphincter, than subject the intestine to the risk of injury from violent efforts at extraction.

HEMORRHOIDS.

The expression Hemorrhoids, in the meaning usually applied to it, comprehends various tumors which are formed at the verge of the anus. It thus denotes a disease of more frequent occurrence than perhaps any other to which the human body is subject, few people, especially those in easy circumstances, who have reached the middle period of life, being entirely free from it in one form or another. The morbid swellings do not all possess the same constitution and characters, but differ in both of these respects so widely, as to require being divided into three distinct sorts. In the *first* place may be mentioned those which depend upon enlargement of the veins at the extremity of the rectum. *Secondly*, those termed External Hemorrhoids, formed by enlargement of the this skin and subjacent cellular texture, which, lining the orifice of the gut, and connecting the mucous membrane of the bowel with the external integument of the body, though naturally seated neither within nor without the sphincter, projects beyond it when distended by inflammatory enlargement. *Thirdly*, those which consist of a vascular development of the mucous membrane, constituting tumors that possess a great tendency to bleed when protruded beyond the anus. They do not occupy this position except in consequence of exertion in the erect posture, or the expulsive efforts employed for evacuating the bowels; and so soon as these causes cease to operate, or pressure is applied externally, they return into their proper place within the sphincter, whence they are named Internal Hemorrhoids. Before particularly considering the structure, symptoms, and treatment of these tumors, it will be proper to inquire generally into the circumstances which give rise to their formation.

CAUSES OF HEMORRHOIDS.

Whenever the bowels are evacuated, more or less of the lining membrane of the anus is everted, and distended by the resistance which is then opposed to its venous circulation. Constipation, by rendering the expulsive efforts more prolonged and laborious, must increase this effect, and tend to produce permanent enlargement of the protruded part. But constipation usually depends on errors of diet or regimen, particularly redundant nourishment, and deficient exercise, causing derangement in the healthy action of the digestive organs, which not only leads to irregularity in the evacuations, but likewise, through the medium of constitutional disturbance, proves a fruitful source of local disease; and as the parts about the extremity of the rectum, as has just been explained, are in such circumstances exposed to more than usual

irritation, it is not surprising that they should frequently become the seat of morbid action. The disease being once established, will promote its own increase by impeding evacuation of the bowels, and from the pain as well as hemorrhage which may attend it, deranging the healthy action not only of the digestive organs, but likewise of the whole system. Pregnancy, enlargement of the liver, and other abdominal tumors, by opposing a free return of blood from the pelvis, will favor the production of hemorrhoids, especially those which depend upon a varicose state of the veins. In addition to the exciting causes which have been mentioned, it would appear that a predisposition to the disease frequently exists, since in some people it is induced much more readily than in others. Persons thus prone to the complaint occasionally suffer from it at the age of puberty; but it seldom proves troublesome until the frame is fully developed, and is generally most distressing from the age of twenty-five to sixty.

VENOUS HEMORRHOIDS.

The lower part of the rectum is supplied with numerous veins lying under the mucous membrane, through which they may be readily distinguished. These vessels in the neighborhood of the anus are liable to varicose enlargement, and then present the appearance of irregular tumors encroaching on the cavity of the gut. They may extend for an inch or more above the anus, but do not show themselves beyond it, unless the nates are held aside, when they are to be seen projecting from the sides of the orifice. They possess a round form, dark color, smooth surface, and tense consistence. The veins thus altered, are liable to inflammation of the same subacute kind to which the varicose *vena saphena* is subject. In this state the tumors become larger, harder, and excessively painful, especially when in the slightest degree compressed, so that sitting and evacuating the bowels occasion great distress. The blood circulating through them frequently coagulates during such attacks; and if it subsequently undergoes absorption, a spontaneous cure may be accomplished. At other times suppuration ensues in the surrounding cellular substance, and may thus lay the foundation of *fistula in ano*. A discharge of blood also occasionally proceeds from ulceration of the enlarged veins, just as happens in the leg.

This form of the disease formerly attracted more attention than either of the others, and has even been supposed to be the sole cause of hemorrhoidal swellings. In a slight degree it is certainly very common, and to this extent frequently exists, along with enlargement of the neighboring textures; but without such complication it comparatively seldom attains sufficient size to produce much inconvenience. The situation of the visible part of the tumors, neither within nor

altogether without the sphincter, together with their form, consistence, and color, renders their recognition very easy. In regard to the treatment, the tendency of the venous tissue to resent irritation seems to forbid any operation, and render excision as well as puncture dangerous. But the veins affected are extremely small immediately beyond the enlarged portion, and no inconvenience is experienced in practice from inflammation of the vessels when the tumors are cut out or simply evacuated by a puncture, provided coagulation of their contents has taken place. In the latter way relief is afforded at once on very easy terms, and it is only in case the patient objects to this being done that soothing measures, such as rest in the horizontal posture, gentle laxatives, as castor oil, injections of tepid water into the rectum, and the hip-bath will be required. When the symptoms are severe, leeches may be placed round the anus, opiate injections should be administered, and lotions, containing acetate of lead with opium, applied to the inflamed parts. By these means the paroxysm is subdued in the course of a few hours, or days at the farthest; and by care afterward in guarding against the causes of excitement, future attacks may be either prevented or rendered less distressing.

[Sulphate of morphia, rubbed up with fresh lard, may be sometimes useful to allay the pain attendant on this form of hemorrhoids. Lead should by no means be injected into the rectum, for Dana has most conclusively shown that it is easily absorbed. I prefer vegetable astringents.—R. S. N.]

EXTERAL HEMORRHOIDS.

The thin skin which connects the internal mucous and external cutaneous covering at the anus, like the same texture in other situations, such as the lip and prepuce, is liable to swelling, from distension of the loose cellular substance which lies under it. Any irritation in the vicinity may occasion this; and the derangement once induced contributes to its own increase, by causing protrusion of the affected part beyond the sphincter, and so promoting the tendency to inflammatory engorgement by impeding the circulation. A tense red tumor, or series of tumors, may then be seen at the margin of the anus, easily distinguishable from varicose veins in the same situation, by their florid color, pyriform shape, and more yielding consistence. In other respects, the symptoms are nearly the same.

Fig. 118.



The inflammation usually terminates in resolution, but sometimes leads to suppuration, and also, though very rarely, proceeds to mortification. When the engorgement attending the excited action subsides, the distended skin may resume its natural condition completely; but, in general, does so only partially, and remaining relaxed, constitutes a permanent pedulous fold at the orifice of the gut, always ready to resent any irritation, and swell to its former, or even a still larger, size. The external pile thus constituted generally contains interspersed through its substance small venous cysts arising from a varicose state of the vessels.

The artificial mode of life, which results from the usages of civilized society, tends so strongly to the production of hemorrhoidal disease, that few people remain altogether free from it; and this form is the one which it most frequently assumes, often existing independently of any other morbid affection, and very generally accompanying other diseases of the rectum. Various methods have been pursued in the treatment of external hemorrhoids; but it is needless to mention any other than excision, since this is undoubtedly the best mode of removing them. Scissors curved to one side will be found the most convenient instrument for the purpose, and may be employed either alone, or with the assistance of double-pointed forceps to steady the tumors during their separation. The operation is very easy, and attended with little pain or bleeding. It is also quite effectual. The best time for its performance is when the hemorrhoids are in a quiescent state; and it should always be insisted upon when they are present in a case requiring any other operation, since, unless removed previously, or at the same time, they would be apt to suffer from the irritation, and, by adding the complication of inflamed piles, greatly increase or prolong the patient's sufferings. The blades of the scissors should be directed from the circumference toward the center of the anus, in order to get at the root of the tumors, unless the whole circumference of the orifice is affected, when a circular portion of the relaxed integuments should be removed. A piece of dry lint is the only dressing required in the first instance, and generally proves sufficient, as the raw surface readily contracts and heals. If necessary, a sulphate of zinc lotion may be applied.

While the hemorrhoids are suffering from inflammation, excision may still be practiced, and it should be resorted to if the patient is willing to endure the pain that attends cutting in this state, in order to get speedily relieved from the complaint. If it be thought better to delay the radical cure until the parts get into a condition more favorable for its easy performance, the same soothing means that have been already mentioned as proper in the treatment of inflamed venous hemorrhoids should be employed. Unless the tumors are very tense,

it is also useful to make gentle pressure on them, to unload their vessels, and promote their return within the sphincter.

As excision always affords an easy, safe, and effectual remedy for external hemorrhoids, it seems unnecessary to say much of the other means which have been proposed, and more or less extensively adopted. The ligature is decidedly objectionable, as being infinitely more tedious, and also more painful than the knife or scissors, without any compensating advantage. The application of astringent ointments, such as the *unguentum gallarum*, is very inefficient, and calculated rather to amuse the patient than to afford him any real benefit; and the introduction of bougies can hardly produce more than a little temporary relief. The best palliatives are attention to regimen, the use of gentle laxatives, such as sulphur with cream of tartar or magnesia, and Ward's paste, which in all diseases of the rectum attended with relaxation has often a remarkably good effect. A portion of it about the size of a nutmeg, may be taken twice or thrice a day. Of local applications the ointment just mentioned, together with an admixture of opium, or subnitrate of bismuth, may be regarded as the best. Or the tannic acid and muriate of morphia may be united with axunge, so as to form a colorless application.

[It is evident that no treatment for this disease or any of its forms can be successful, if the patient allows his bowels to become costive, and he neglects his general health.—R. S. N.]

INTERNAL HEMORRHOIDS.

The mucous membrane at the extremity of the rectum immediately above the thin skin, which is the subject of the last mentioned swelling, is liable to a morbid development of its texture that gives rise to very serious symptoms. There are thus formed tumors seated altogether within the sphincter, unless when forced into view by sufficiently powerful expulsive efforts, and hence named Internal Hemorrhoids. They possess an irregularly round form, and florid color, a granular uneven surface, and a very vascular structure, so as to bleed freely from the slightest injury. They resemble a strawberry in appearance, and seldom existing singly, in general constitute together a more or less complete annular swelling, which, when protruded beyond the anus, seems to close the aperture of the gut, and is surrounded by an external ring proceeding from distension of the neighboring loose texture, which is the seat of external hemorrhoids. The two kinds of growth thus associated are easily distinguished, not only by their difference of position, the one being seated within the other, but also by their difference of surface, the one being smooth and cutaneous, the other granular and mucous.

The substance of the internal hemorrhoidal tumor is so vascular

and disposed to bleed, especially when forced beyond the sphincter, that it has been considered similar to the erectile tissue which composes aneurism by anastomosis and nævus. But these diseases are, with few if any exceptions, of congenital origin; while internal hemorrhoids rarely make their appearance before the age of maturity; and the vessels of the latter growth, instead of being dilated into the cellular-looking structure which composes the former, are small and arborescent. There hence does not appear to be any analogy between the two morbid structures farther than their disposition to bleed.

How this growth of the mucous membrane originates it is not very easy to explain. The circumstances which have been mentioned, as accounting mechanically for distension of the veins and swelling of the lax textures at the verge of the anus, cannot operate here; and we must be satisfied with inquiring into the causes which operate less directly in producing the disease. Like other hemorrhoidal affections it occurs chiefly in the vigor of life. It is much more common in males than females, and in both sexes greatly more frequent in the higher than the lower ranks of society. Residence in warm climates, a luxurious diet, deficient exercise, and excitement of the generative organs, are the circumstances which seem to have the most powerful influence in determining its commencement, and encouraging its progress, especially when several of them operate together. Literary pursuits and a professional life, by occasioning sedentary habits, are observed to favor the production of this morbid excrescence. It would seem, in short, that the superfluous nourishment usually acquired by persons in easy circumstances, when not expended in bodily exertion, is apt to find vent through the channel of internal hemorrhoids, into which it may be directed by the opposition afforded by a sitting posture to the free return of blood circulating in the pelvic viscera.

The symptoms which attend this kind of hemorrhoid may be divided into three sorts, namely, painful sensations, protrusion of the tumor, and hemorrhage. Some patients complain of all these inconveniences equally; others complain of them singly. But in general they are present together, while one of them predominates by its severity, and the attention consequently bestowed upon it. The painful sensations are referred either to the seat of the disease itself, or to the urinary organs, with which the rectum is intimately united in sympathy. The pain of the swellings is sometimes described as dull and oppressive, at other times sharp and lancinating. The irritation of the urinary organs occasions uneasy feelings in the course of the urethra, frequent desire to make water and difficulty in doing so. There is no regular proportion between the extent of the disease and the severity of its symptoms, nor is there any difference observable in the appearance of the tumors adequate to account for the variety

which occurs in the nature as well as the degree of the annoyance occasioned by them, and which no doubt must depend upon individual peculiarities of local or constitutional irritability. A gentleman about thirty-five years of age, complained of pain at the extremity of the rectum, which was seldom entirely absent, and from which he occasionally suffered so much as to feel quite unhinged and incapacitated for any exertion either of body or mind. On examination I could find no morbid appearance except a very small internal hemorrhoid, not larger than the point of the little finger, the removal of which completely relieved him. The urinary symptoms are sometimes so prominent as to call attention from the true seat of the disease. A gentleman, about fifty, suffered for years from excessive pain in the region of the bladder, with frequent desire to make water. He consulted a great many physicians and surgeons of eminence, and had at length made up his mind that the disease, in accordance with the opinion of a distinguished pathologist, was tic douleureux of the bladder, when a medical friend thought of examining his rectum, and discovered several large internal hemorrhoids, which I removed with the effect of affording complete relief.

The protrusion of the swellings is a nearly constant symptom of the disease, and is troublesome in proportion to their size. At first the tumors pass beyond the sphincter only during the forcible and continued efforts to evacuate the bowels which attend constipation; but by-and-by they descend more readily, and return with more difficulty, requiring to be pushed up by external pressure; and in cases of old standing, where the skin lining the anus, from being frequently put upon the stretch, remains permanently relaxed, hanging in folds round the orifice, the tendency to protrusion is so great, that the hemorrhoids descend not only upon occasion of going to stool, but also whenever the patient makes the slightest exertion, or even when he simply assumes the erect posture. The protruded part is of course painful, especially when subjected to pressure; and, by soiling the patient's clothes with the mucous and bloody discharge that issues from its surface, is a constant source of annoyance. A middle-aged lady, whom I saw with Dr. Begbie, had been confined for two years to the horizontal posture by hemorrhoidal swellings, which descended from the gut whenever she attempted to walk or stand. After the disease was removed she could walk for miles without any inconvenience. A gentleman, about fifty, whom I saw with Dr. Davidson, had suffered for upward of eighteen years from a protrusion of this kind, and holding an office in the courts of law, which frequently required him to sit for many hours, in public, endured more distress than it is easy to describe or imagine. He was completely relieved by removal of the enlargement. A man, about forty, from Dundee, was in the hospital here under my care on

account of a hemorrhoidal protrusion, which had troubled him for more than twenty years, and latterly disabled him entirely for his occupation, which was that of a weaver. He returned home quite well. Cases without end could be mentioned in illustration of the protrusion of the tumors constituting the prominent feature of the disease. It is such cases which generally go under the title of *Prolapsus ani*, and being supposed to depend upon weakness of the sphincter, are palliated very imperfectly by the application of bandages to support the gut. Such means of palliation are no less unpleasant than inefficient, and in some respects, indeed, may be considered as even more irksome than the disease itself. It is, therefore, of the utmost importance to take a correct view of the derangement, which leads to an easy, safe, and effectual remedy.

The bleeding which proceeds from internal hemorrhoids is the most alarming symptom attending the disease, and the one which occasions the most serious effects. It takes place when the tumors are protruded beyond the sphincter, and varies in amount from a few drops to several ounces. The blood sometimes seems to ooze from the surface, and at other times springs out in a jet, extending, if permitted, to the distance of several feet; whence it is often supposed that the patient has ruptured a bloodvessel. The quantity lost at each time of going to stool is very unequal, and varies with the condition of the patient, increasing when there is general irritation of the system or excitement of the pelvic viscera, and diminishing in circumstances of an opposite kind. For weeks or months the hemorrhage may cease altogether, and then return more vigorous than ever; but its general tendency is to increase with the duration of the complaint. At its commencement the discharge of blood may in some instances be regarded as salutary, as it occasionally seems useful in relieving other parts of the system from oppression. But when it becomes habitual and copious, beside the unpleasant feelings connected with it, very serious derangements of the system are apt to be produced. The patient loses flesh, and acquires a remarkable paleness of complexion, which is afterward exchanged for a peculiar dingy yellow hue, like that of imperfectly bleached wax. The lips no longer possess their vermilion color, and resemble those of a dead body; the tongue too has a blanched appearance very characteristic of the state induced by excessive or continued depletion. These symptoms are attended with great listlessness, or want of energy both of body and mind, disturbed sleep, irritability of temper, quick pulse, and headache, which is generally increased by rising up more than by lying down. Palpitation and pain in the region of the heart, and difficulty of breathing, are also frequently induced by slight exertion or agitation of any kind. In advanced stages of the disease there is sometimes œdematous swelling of the feet and legs. A fixed pain

in the region of the colon, especially on the right side, occasionally also proves troublesome, and, together with irritability of the bowels, is apt to distract attention from the real seat of disease, by simulating chronic dysentery; while derangements of the stomach proceeding from the same source are often treated under the title of dyspepsia.

It is obvious that the condition which has now been described must not only prove very distressing in itself, but tend to the production of other serious diseases; and, therefore, ought to be remedied with the least possible delay whenever ascertained to be present. A popular prejudice has existed against interference with bleeding piles, on the ground that harm may arise from suddenly checking a habitual discharge; but the worst consequences thus anticipated are hardly to be dreaded more than those directly sustained from the disease; and the result of experience is quite opposed to the apprehension of harm being so produced. In illustration of the safety with which the hemorrhage may be arrested, even when of the longest standing and greatest extent, I may mention the case of a lady whom I attended with Dr. Donaldson, of Ayr. At an early age she had begun to suffer from hemorrhoids, and thirty years before I saw her had been advised by Mr. Benjamin Bell to have them removed. This was declined, and the disease went on increasing with all the usual symptoms, until at length the bleeding, which for seven or eight years had been very profuse, so affected the general health as to excite the serious alarm of her friends. She exhibited in an extreme degree the peculiar aspect and other symptoms of exhaustion caused by a continued drain of blood. But very soon after the removal of the hemorrhoidal tumors, which were large and numerous, so as to encircle the aperture of the gut, she regained her strength and healthy look; and though many years have now elapsed since the operation was performed, she has not suffered any unpleasant symptoms from the sudden suppression of her complaint.

The existence of bleeding from internal hemorrhoids frequently escapes the observation of the medical attendant, from the patient carelessly overlooking or willfully concealing it. In females, the delicacy of the sex, which is an additional obstacle to discovering the disease, should excite corresponding vigilance on the part of the surgeon; and whenever there is any ground for suspecting its existence, an examination of the bowel in its most protruded state should be insisted upon before giving any opinion of the case. It is also very necessary to beware that the symptoms, especially those connected with the circulation, do not obscure the nature of the disorder, and make it appear to depend on what are really its secondary effects. As an instance of this, I may take the case of a gentleman, about forty, an English commercial traveler, whom I saw with Mr. Alexander.

He had labored long under what was supposed to be disease of the heart, and been treated for this complaint by one of the most eminent provincial physicians in England. His waxy look, bloodless lips, and defective energy, together with irregular action of the heart, certainly afforded considerable ground for this opinion; but Mr. Alexander discovered that there was an internal hemorrhoid, which bled profusely every time the patient went to stool, and I removed it, with the effect of quickly restoring him to health. There is reason to fear that in such cases as this the cause has not only been mistaken for the effect, but may even have been supposed to exert a salutary influence in moderating the violence of its action—in other words, that the flow of blood from the rectum has been supposed to depend upon disease of the head or heart, and to be useful in lessening its force. Such erroneous views may have led to the equally erroneous practice of abstracting blood artificially in these circumstances; the effect of which may be easily imagined.

The treatment of internal hemorrhoids is generally regarded with much uncertainty and apprehension, from the conflicting opinions of practical writers on the subject, and the disagreeable results of some methods which have been pursued. Excision is certainly the quickest and easiest mode of removing the tumors, but is very apt to occasion a serious or even fatal hemorrhage. The blood does not readily escape externally, but, accumulating in the rectum, excites the desire to go to stool, and is then voided in the form of a dark-colored feculent-looking fluid, which may impose upon the attendants, and conceal from them the true situation of the patient. Sir A. Cooper has related the case of a Scottish nobleman who perished in this way, and several other instances of the same kind. If other practitioners had been equally candid, we should doubtless have had more testimony as to the danger of this operation; and every surgeon who has practiced it must have experienced more or less alarm. Before my own views were settled as to the best means of treating the disease, I on one occasion cut away an internal hemorrhoid, which was partially protruded, and found it necessary to employ manual pressure for several hours to restrain the bleeding that followed. In another case of the same kind, I succeeded in securing the vessels by ligature. In order to obviate this danger, it has been proposed to transfix the base of the protruded part with pins, to prevent the raw surface from being drawn within the sphincter until the bleeding ceases, or is arrested by ligature. But it is to be feared that the hemorrhage, though prevented so long as the part was kept tense by the pins, might occur after their removal, unless they were allowed to remain until the orifices were sealed up with lymph, which could not be done without the risk of exciting inflammation and constitutional disturbance, to say nothing of the prolonged confinement

and distress necessarily attendant upon such a mode of procedure. Indeed, from many such cases which have come to my knowledge, I feel satisfied that the danger of bleeding, however great it may be, constitutes but a small part of the risk attending excision of internal hemorrhoid, since the cause of death after such operation, so far as I have been able to learn, is usually inflammation spreading along the intestinal coats. It may escape observation or be mistaken for a dysenteric attack, and being quickly followed by sinking, is apt to be attributed to some specialty in the patient's system, while in truth entirely owing to the unsound principle of treatment. A gentleman from Glasgow consulted me for an ordinary growth of internal hemorrhoids, and was advised to have them removed by ligature—but not wishing to displease his ordinary attendant, submitted to excision, and died within a fortnight. The officer commanding one of her majesty's regiments recently returned to the south of England, after long service in India, came to Edinburgh in quest of relief from very large hemorrhoidal tumors, which were protruded by the slightest exertion, and, indeed, could hardly be restrained at all within the sphincter. He said that before going abroad, he had some operation performed in Dublin, but obtained no relief; and latterly could not sit on horseback without placing his handkerchief rolled into a ball under him on the saddle, having upon one occasion in this wretched plight led his regiment into action—a greater effort of heroic resolution than can well be imagined by any one who is not familiar with the depressing influence of what is usually called prolapsus. I saw this gentleman with Dr. Alison, and at first felt doubtful how far any operative interference would be warrantable in consideration of the patient's age and derangement of health consequent upon long residence in a tropical climate, but confiding in the safety of ligatures, ventured to employ them with the happiest result. Encouraged by this success, the officer next in command, who was suffering from the disease, though to a much smaller extent, went to London, submitted to excision, and died in a few days.

Excision being thus objectionable, caustics of different kinds, such as the concentrated mineral acids, and the actual cautery, have been employed for destroying the hemorrhoidal growth, and might possibly be so managed as to prove useful in doing so, if there were no preferable means of accomplishing the object. But as they are extremely painful, tedious, and uncertain, while there is another which perfectly attains all that can be desired in treating the disease, without any of these objections, I may proceed at once to speak of it, namely, the Ligature.

By applying a sufficient number of ligatures to the roots of the tumors, they may be certainly removed without any danger of bleeding.

But it has been alleged, that instead of this danger, another not less formidable is encountered in inflammation, spreading from the strangled parts, and either terminating fatally, or causing extensive suppuration and sloughing in the neighborhood of the anus. The seeming resemblance between the condition of an internal hemorrhoid, to which a ligature has been applied, and a strangulated hernia, makes it appear likely that this effect would follow the operation; but experience teaches, what a more careful analysis of the cases would lead us to expect, that the bad consequences thus anticipated do not really present themselves. In a strangulated hernia, the circulation of the protruded parts is not entirely obstructed, but merely impeded, so as to cause irritation and inflammation, with its usual local and constitutional symptoms, aggravated by the importance of the affected part; while a hemorrhoid subjected to the ligature is completely detached from any share in the vital action of the system, which, consequently, cannot be influenced by its condition. Accordingly, however similar the two cases may appear at first view, their results prove very different; and I feel warranted, after very extensive employment of the ligature, to state, that it may be used without the slightest risk of any serious inconvenience. Indeed, in the whole course of my practice, I never met with a case which either terminated fatally or threatened to do so, where the ligature simply was employed.

In order to account for the bad consequences which Mr. Copeland and others have related as occasionally attending the use of the ligature, it will be sufficient to remark, that if the threads are not drawn tight—if such large portions of the morbid texture are embraced by them as to prevent the degree of compression requisite for preventing altogether the circulation through the tumors—or if the whole of the disease is not included, disagreeable effects may not improbably ensue. Sir A. Cooper has advised that the ligatures should not be drawn tight, with the view of lessening the pain caused by them. But, with all deference to his high and justly esteemed authority, I feel no hesitation in stating, that while the suffering of the patient cannot in this way be rendered less severe in the first instance, it will ultimately be much greater, as well as more prolonged, and attended with more danger of spreading inflammation, than if the strangulation had been completed at once. To lessen the pain, it has also been proposed to cut away the tumors, immediately after they are tied, close or near to the knot, which method, it is obvious, must be attended with another danger, since the ligature, when thus left unsupported will be apt to slip off, and permit the vessels to bleed. If the threads are drawn tight they will not so readily quit their hold; but in this case no advantage can be derived from removing the strangulated parts, as

they cease to maintain any living action, and very soon collapse into the form of flaccid bags.

I thought at one time that the best method of employing the ligature was to include at first only a small portion of the disease, with the view of avoiding any risk of exciting more irritation than the part or patient could safely bear; but I am now persuaded that by doing so, much greater pain and danger of undue excitement are occasioned than by the summary process of tying all the tumors at once. In illustration of this, I may mention the case of an eminent provincial practitioner whom I attended many years ago with Dr. Abercrombie. He had long suffered from the bleeding of internal hemorrhoids, and was at length reduced to a state of extreme exhaustion. From being a strong muscular man, he had become a feeble emaciated invalid, unable for any exertion of body or mind, with the waxy look, frequent small pulse, and headache in assuming the erect posture, which characterize the state arising from continued depletion. As the tumors were large and numerous, I commenced the treatment by tying one of the smallest, with the view of ascertaining what degree of freedom might be used with the remainder. The ligature separated at the end of two days, but the other excrescences swelled and protruded from the anus to the excessive distress of the patient, who described his suffering as intolerable, and alarmed the neighbors by his cries. As his pulse suffered little alteration in frequency or hardness, and his belly continued free from pain, no apprehensions were entertained as to the result. The inflammation accordingly did not extend beyond the limits of the diseased growth, the whole of which mortified and sloughed off, leaving the patient as it appeared completely freed from his complaint, though at the expense of much more suffering than had been anticipated. This gentleman about two years ago again applied to me in even a worse state than upon the former occasion. His feet and legs were œdematous, his pulse was extremely frequent, small, and irregular, and the slightest exertion, such as that of ascending a few steps, always induced an attack of breathlessness that threatened to prove fatal. Though the tumors were nearly twice as large as they had been formerly, I did not scruple to include the whole of their extent in ligatures at once, and with the happiest effect, as he gradually regained the most perfect health both locally and generally without any untoward occurrence.

It is not difficult to explain why a partial operation should produce unpleasant effects. The morbid texture of hemorrhoidal tumors, like all other formations not entering into the original constitution of the body, being prone to excited action, readily inflames when injured, and suffers more acutely than the natural textures. The slighest excitement is apt to make it swelled and painful, and when it is in part

subjected to the ligature, inflammation more or less destructive of the remainder is thus occasioned, while, if the whole be included at once, the destructive process is accomplished with wonderfully little uneasiness. On the same principle any operation attended with local irritation in the neighborhood of internal hemorrhoids, is apt to be followed by troublesome consequences from their excitement. A gentleman came under my care for *fistula in ano* with this complication. I advised that both complaints should be remedied at the same time, to prevent the irritation caused by an operation for one of them, from injuriously affecting the other. The patient, however, persisted in requiring the fistula to be cut by itself in the first place, which was done, and followed by a very distressing paroxysm of the hemorrhoidal disease. He returned to the country to recruit his health, and came some weeks afterward to have the excrescence removed. Another patient came to be operated upon for fistula, and made no mention of any other ailment. I performed the necessary incision, and a day or two afterward was surprised to see a large internal hemorrhoid protruding from the wound. He then told me that he had long suffered from bleeding piles; and I expressed my regret that this communication had not been made sooner, as both diseases might have been remedied together, with less inconvenience than he was then suffering. It happened fortunately that the inflammation proved so intense as to destroy the tumor, which sloughed off so that the recovery was completed without any farther operation, but certainly, as in the last case, with more pain and confinement than if the hemorrhoid had been tied when the fistula was cut. Still pursuing the same principle, when any pendulous folds of skin are observed to surround the anus in a case of internal hemorrhoids, I should advise them to be removed with the scissors at the same time the ligatures are applied, lest they inflame and prove troublesome in consequence of the neighboring irritation.

When the operation is to be performed the patient should take a dose of castor oil, so as to evacute his bowels previously to it, as they had better not be moved for forty-eight hours afterward. The hemorrhoids having been fully protruded by a sufficient degree of straining, the patient either stoops forward, resting with his arms on a chair or table; or if a female, lies on one side with the limbs drawn up, so as to expose the parts concerned. The surgeon then introduces the point of the fore-finger of his left hand within the ring which is formed by the morbid growths, and, keeping it there as a guide, transfixes the roots of the tumors in succession with a needle and double thread, directed from without inward through the center of each close to the base. The ligatures, which should be waxed silk, of ample strength, are next to be tied as tightly as possible, each of course including the

half of a tumor. Their ends are then cut away as near to the knots as may be, without endangering their security; and the protruded parts are lastly pressed gently back within the sphincter. The whole of the skin surrounding the anus, which is relaxed or distended so as to constitute external piles, is then to be cut away either in separate portions, or in the form of a ring, according to its extent.

The symptoms consequent upon the operation vary with the extent of the disease, and the irritability of the patient. There is seldom much, or indeed almost any complaint of pain, until the ligatures are tied; and the patient even then in most cases feels little inconvenience. The suffering which attends the next step of the process, however, is in general considerable, and often very severe, and the patient who may not have winced or groaned during the application of the ligatures, is sure to complain while the scissors are employed to remove the hemorrhoidal swelling. The pain is most intense at first, and usually subsides gradually in the course of a few hours, until it is little or not at all perceptible. Want of sleep is frequently one of the effects produced, and is sometimes accompanied with nervous excitement, rendering the patient restless. The pulse is seldom much affected, and when it does suffer disturbance, merely becomes quicker without any of the hardness which denotes an inflammatory state of the system. The bowels are constipated, so as not only to cease evacuating their contents spontaneously, but to require laxatives of greater power than is sufficient in ordinary circumstances. Difficulty of making water, sometimes amounting to complete retention, and requiring the catheter to be introduced, frequently occurs, but seldom continues beyond the first twenty-four hours, unless the bladder is unfortunately allowed to become over-distended. When the bowels are evacuated, which they should be not later than the second day after the operation, there is seldom any protrusion, and in general no bleeding. Little inconvenience is experienced after the unpleasant effects immediately consequent upon the operation have subsided, until the ligatures separate, which is usually about the end of a week; when a painful feeling is often complained of in the raw surface left by the sloughs, and a little blood is occasionally discharged along with the evacuations. Soon after this, the irritated parts regain their natural condition, and all the disagreeable symptoms which proceeded from the disease, as well as those caused by the operation, completely disappear.

Such being the consequences of tying internal hemorrhoids, the treatment after the operation may be easily determined. An opiate, containing thirty drops of the solution of muriate of morphia, should be administered to the patient if he complains of pain, and be repeated from time to time if it continues severe, or the want of sleep proves distressing. Fomentations may at the same time be applied to the

anus; and if, notwithstanding the use of these means, suffering is still experienced, the hip-bath, followed by poultices, should be employed. The retention of urine, if slight, may be relieved by giving the *Spiritus Ætheris Nitrici*, or the camphor mixture; and if more obstinate, will require the catheter to be introduced occasionally so long as it lasts. The patient should restrict himself to the antiphlogistic regimen, and drink freely of simple diluents, such as barley-water, or linseed tea, to lessen the acrimony of the urine. He should also confine himself chiefly to the horizontal posture until the ligatures separate. In general, very little requires to be done in the way of treatment, the patient, after the first hour or two, usually suffering hardly any uneasiness, and even then scarcely more pain than what frequently attends the disease.

Before the first edition of this treatise was published, ligatures were little employed in the treatment of internal hemorrhoids; being, indeed, usually mentioned not for commendation, but rather avoidance, on account of the danger alleged to attend their use. The decided testimony which I felt warranted to offer in favor of the facility, efficiency, and safety of this method, together with the success attending its practice on the principles above explained, has, I believe, had some effect in establishing the confidence which is now so generally placed in the ligature; and I venture to hope that, ere long, it will alone be employed for the purpose, instead of the painful, uncertain, and dangerous means which are still not entirely abandoned. Very lately, a lady had the trouble of traveling six hundred miles to come here, that I might relieve her from a disorder consequent upon the use of nitric acid for the removal of an internal hemorrhoid; and not long ago, we heard of a valuable life being lost in one of the capitals of her majesty's dominions, from the employment of the actual cautery for this purpose.

[And if Mr. Syme will investigate a little further, he will find that there are as great abuses in other departments of surgery. He is, indeed, often wrong himself; but with the influences surrounding him, it is strange that he should have been enabled to so boldly step out from the beaten track, and confront his brethren with their errors. We ourselves may be wrong also in many things; we do not claim perfection; but we claim an honest desire to render medical science more positive than it is.—R. S. N.]

POLYPUS OF THE RECTUM.

The rectum is sometimes, though very rarely, the seat of morbid growths from the mucous membrane, to which the title of Polypus has been applied, rather on account of their form and origin than from similarity of texture to the growths so designated in other parts of the

body. The extreme rarity of this disease may be estimated from the statement of Sir A. Cooper, that in the whole course of his experience he met with only ten cases of it.* He says that it generally occurs in children, and very rarely in adults, and that the most advanced age at which he has met with it was twenty-two. Most of the cases that have fallen under my own observation were in persons who had attained or passed the middle period of life. In five, which, by a curious coincidence, came under my care in the course of little more than a fortnight, two were in adults, and three in children.

The disease presents itself in three different forms, of which one usually occurs in childhood, and does not appear much beyond puberty. A gentleman now established in practice, not far from Edinburgh, when attending my lectures—then, I suppose, about eighteen or nineteen years of age—applied to me for the removal of a polypus, such as is met with in early life; but, with this exception, I never met with it beyond the ninth or tenth year. It is extremely soft and vascular, of a florid red color, and assumes the form either of a worm from two to four inches in length, or of a strawberry with a connecting foot-stalk two or three inches long. This tumor seldom protrudes except when the bowels are evacuated, and then admits of ready replacement, though not without occasional and considerable hemorrhage. The vascularity of this growth, and its attachment above the sphincter, made me averse from removing it by excision; and Sir A. Cooper has mentioned the alarm that was, on one occasion, excited in his practice by doing so. I have always employed the ligature; and though the soft texture readily gives way when the thread is drawn, bleeding has never occurred in a single instance, nor has any other symptom in the least degree disagreeable resulted from this mode of removal. I am, therefore, induced to regard it as the best that can be employed.

In adults the disease appears in two very distinct forms. In one of these, the growth is soft, vascular, prone to bleed, lobulated or shreddy, and malignant-looking, but possesses a peduncle or foot-stalk, sometimes capable of sound cicatrization after being divided. The profuse, frequent, and protracted bleeding which proceeds from this sort of growth, renders its removal an object of great consequence; and this may be effected very easily, with perfect safety, by transfixing the radical cord of connection with a double ligature, tying the threads so as to include a half of it in each, and then cutting it across a little below the constricted part. In a patient of Mr. Craig, of Ratho, who detected the disease from the great hemorrhage it occasioned, I could not accomplish protrusion of the tumor, but guided a ligature on my finger, and tied it on the neck within the rectum. It is more satisfac-

* Surgical Lectures.

tory to force or draw the swelling beyond the sphincter, so that the sound and morbid parts may be distinguished with certainty, and this can usually be done with great facility, although the growth has attained a large size. In a hospital case, recommended by Mr. Anderson, of Castle-Douglas, I brought into view and removed a tumor not less than an orange, which had a most malignant aspect, and had nearly exhausted the patient by hemorrhage.

In the other form which polypus of the rectum assumes in adults, the tumor is of a firmer consistence, smoother surface, and more regularly spherical or oval form. The symptoms resulting from this simple swelling are rather annoying than seriously alarming; and the patient, therefore, is apt to delay requiring assistance for a long while. In the case of an old lady, whom I saw with Mr. Hilson, of Jedburgh, the tumor was about the size of a cherry, with a long stalk, and we were assured had protruded every time the bowels moved for twenty years. In another case, a gentleman whom I saw with Dr. Johnston, of Cumnock, the tumor was nearly as large as an egg, had a cuticular covering, and appeared to have existed for a period equally long. I have always removed these growths in the way that has been already described, and never met with the slightest consequence of a disagreeable kind.

While this sheet is passing through the press, I have under my care a patient who came from the country on account of *fistula in ano*, which had been twice cut, under the impression that it did not communicate with the gut. Having found an internal opening in the usual situation, I divided the septum, and filled the cavity with lint. Upon visiting the patient, a few days afterward, I was surprised to see a lobulated tumor nearly the size of a pullet's egg protruding from the wound, and then learned that, for twelve or thirteen years, there had been occasionally a partial protrusion of this swelling, but not to the full extent which had resulted from the additional freedom afforded by the incision. Ligatures were immediately applied, and the patient now seems to be completely relieved from his complaint.

PROLAPSUS ANI.

Prolapsus Ani denotes a protrusion of the intestinal coats through the anus, so as to constitute an external tumor. The extent to which this occurs varies from the slightest eversion of the mucous membrane immediately within the sphincter, to the descent of the whole thickness of the gut for a considerable part of its length. In cases of the latter kind, it is probable that the sigmoid flexure of the colon is the part of the intestine that protrudes, since it is difficult to conceive how the rectum could suffer the requisite displacement. Whatever portion is forced beyond the sphincter has its circulation impeded, and conse-

quently becomes thickened and livid. When the mucous membrane alone is everted, it presents the appearance of a ring, but when there is prolapsus of all the coats, the tumor is globular, varying from the size of an egg to that of a child's head, and affords a copious secretion of bloody mucus, which very much resembles red currant jelly.

Prolapsus of the whole thickness of the gut, or what may be called complete prolapsus, occurs chiefly in children and aged persons, especially females of relaxed frame. That of the inner membrane, or partial prolapsus, is generally observed in the vigor of life. The exciting causes of the former are, in children, severe or long-continued straining at stool, and in adults, generally violent exertions, as in lifting weights on the back. Some local irritation, as that of ascarides in the rectum, or stone in the bladder, is often concerned in producing the disease in young persons, especially when it attains a great extent. The partial prolapsus, which is usually met with in adults, depends upon the presence of hemorrhoids.

An attentive consideration of the circumstances, which have just been mentioned, will indicate the preventive and remedial measures that promise to be most beneficial. In treating the complete prolapsus of children, it is necessary, in the first place, to remove any local source of irritation that may be discovered to exist; and, should there not appear to be some such exciting cause, the patient must be prevented from straining long or violently at stool, by having his bowels kept in an easy state, and by being placed on an elevated seat, which will not permit his feet to reach the ground, and consequently render it difficult for him to bend his body forward, which makes the pressure of the diaphragm act more directly on the contents of the pelvis. The partial protrusion that occurs in adults, requires for its remedy the removal of hemorrhoidal excrescences, whether external or internal—the prevention of constipation by suitable regimen and medicine—and the use of injections thrown into the rectum. When there is much relaxation, and consequent tendency to prolapsus, it will be observed, that the integuments round the margin of the anus, when the gut has been replaced, are not tense and smooth, but loose, and thrown into radiating folds. M. Dupuytren proposed to cut away some of these folds, and, by thus diminishing the extent of the redundant skin, while consolidation of the remainder was induced by the adhesive process following the inflammation excited by the operation, radically cure the disease. Mr. Hey, of Leeds, with a similar view removed the whole of the loose skin. This excision is easily performed, and though not so effectual as might be desired, ought to be tried when other means have failed in affording relief. Scissors curved on the side are the most convenient instruments for the purpose, and the superficial dressings ought to be applied after the operation. Sometimes the ring

of the prolapsed membrane, from inflaming, becomes permanently protruded, and the patient, who suffers constant pain, can neither walk nor stand. In these circumstances, the whole of the protrusion may be cut away with perfect safety and complete relief, immediate as well as permanent. The disease is best treated, however, when in its ordinary state and free from inflammation. It is then easy to ascertain the exact extent of hemorrhoidal swelling concerned, and employ the requisite measures. In every case the whole of the internal piles should be removed by ligatures, and after they have been tied, any of the external kind that appear are to be carefully cut away, together with the loose redundant integument surrounding the orifice of the gut. In all operations at this part, it should be a rule never to leave any hemorrhoidal growth either external or internal, since the portion permitted to remain will be almost sure to inflame and prove troublesome.

The tumor that is formed by prolapsus of the whole thickness of the intestine, whether occurring in children or adults, is in general very readily reduced by slight pressure, provided the expulsive efforts have ceased, and the patient assumes the horizontal posture. Occasionally, however, from the parts being allowed to remain for hours, or even days protruded, the intestinal coats become greatly thickened, consequently increasing the size of the swelling, and rendering replacement of the gut more difficult. A manipulation, similar to that of the taxis, must then be carefully employed, after the surface of the tumor has been lubricated with oil. The neck, or part next the anus, is steadily compressed with the fingers, and then pushed upward through the ring which is formed by the sphincter. Successive portions are to be returned in the same way, until the remaining portion is so small as to admit of being pushed up at once.

[I cannot refrain from adding here a later treatise on prolapsus ani by Mr. Syme.—R. S. N.]

Next to fistula in ano, there is no term so frequently applied to diseases of the rectum as *Prolapsus ani*. Whenever protrusion of the lining membrane of the bowel takes place from straining at stool or any other sort of exertion, it is in general supposed to depend upon weakness of the sphincter muscle, and to require mechanical support for its relief or remedy. Now in a very large proportion of such cases there is no want of muscular power, but merely a morbid thickening of the mucous texture, which, swelling so as to occupy and distend the sphincter, prevents it from contracting fully. The so-called "Prolapsus," therefore, is almost always nothing more than an internal hemorrhoidal growth, of which the removal is sure to afford complete and permanent relief. Considering how readily this may be accomplished, it is painful to reflect upon the number of persons whose

existence is embittered by the constantly increasing annoyances of a complaint not only distressing through its direct effects, but if possible still more subversive of comfort by its enervating influence upon the frame generally. They too frequently either abstain from asking relief, under the impression that their disease is incurable, or aggravate their misery by the employment of mechanical support, afforded by bandages, recommended to them through the same erroneous impression on the part of their medical attendants.

In order to avoid this mischievous confusion, it should be understood that the protrusions usually comprehended under the title of prolapsus are of two distinct kinds: one being constituted by morbid growths of the lining membrane, or internal hemorrhoids; the other consisting of the intestinal coats retaining the natural texture, and simply displaced from their proper position within the sphincter. The latter sort of protrusions occur in consequence of some local irritation, such as that of a stone in the bladder, or a morbid state of the bowels inducing violent expulsive efforts on the viscera of the pelvis; and also, independently of any undue force, from a relaxed condition of the sphincter, permitting a portion of the bowel to descend from its own place. These two forms of the disease might be distinguished as the prolapsus from irritation, and the prolapsus from weakness.

PROLAPSUS FROM HEMORRHOIDS.

With regard to the nature, symptoms, and treatment of this morbid derangement, I may refer to what has been said under the head of Internal Hemorrhoids. But as the diagnosis cannot be too strongly recommended to attention, some additional remarks upon this part of the subject may here be added.

When hemorrhage, pain, or urinary irritation are prominent symptoms of the case, its true nature, though frequently overlooked, is less apt to be mistaken than when little inconvenience is experienced in these ways, and the annoyance chiefly suffered is from protrusion being induced by exertion. It is then that the unfortunate appellation of Prolapsus or "falling down" of the gut is most apt to exclude the patient from any hope of effectual relief, and either consign him to the misery of brooding over his complaint in silence, or deliver him to ignorant and designing empiricism. If it were consistent with the plan of this treatise, I could relate histories of the distress thus experienced in all ranks and almost every occupation of life during long series of years, with such effects upon mind and body as to suggest the inquiry how far character and conduct may often have depended upon a complaint so strictly local and easily remediable.

Patients laboring under this tendency to protrusion generally suffer more or less from derangement of the digestive organs, attended with

various unpleasant symptoms, for which they are wont to require the aid of physic; and as some temporary benefit may be derived from this source, the evil is allowed to pursue its course under a system of imperfect palliation. Such cases afford a fruitful field for the practices of those unprincipled quacks who thrive on the foolish credulity of the upper or affluent classes of society, which leads to entrusting the charge of life and health, not through careful inquiry into professional character, but by blindly following the fashion of the day. These persons constantly impress upon the patient that removal of the local disease would be attended with "the utmost danger;" and so it would—but to no other interest than that of their own pockets. In the whole course of my practice I never met with an unfavorable result, either immediate or remote, from the operation, when properly performed; and I therefore feel no hesitation in recommending the method of treatment which has been explained, as no less safe than perfectly effectual.

It is in this form of the disease that the various plans of treatment for removing *prolapsus ani* by operation proposed by Hey, of Leeds, Dupuytren, etc., have been applied. The essential part of all these procedures consists in removing, or otherwise destroying, a portion of the relaxed integuments which surround the anus. In some cases this may prove sufficient, but it is always attended with the double risk of affording only partial relief, and of causing a painful attack of inflammation in the morbid texture allowed to remain; while complete removal of the whole diseased part, as I have advised, by the combined employment of ligature and scissors, while hardly more severe at the time, effectually precludes the occurrence of painful consequences, and the danger of relapse.

PROLAPSUS FROM IRRITATION.

This form of the disease is nearly confined to the period of infancy and childhood. It is not limited in extent to a small part of the gut, but affects so large a portion of it as to occasion a complete invagination of the bowel, and to establish a similar condition to that which, taking place within the abdomen, is named Intus-Susception. The tumor that appears externally varies in size, but generally resembles an egg or small orange, though sometimes cylindrical in its form.

The decent is usually excited by straining at stool, or vehement crying; and these causes are, for the most part, called into action by some influence of an irritating nature, such as a stone in the bladder, teething, intestinal worms, or chronic inflammation of the mucous membrane of the bowels.

The treatment of prolapsus resolves itself into the means required for replacing the intestine, and those employed for preventing a return

of the complaint. In order to attain the first of these objects, the patient should be laid horizontally on his side or back, the limbs bent on the pelvis, and desired not to hold his breath, which, by compressing the abdominal viscera, opposes the ascent of the gut. The surgeon then grasps the tumor, having previously lubricated its surface with oil, and gently, but steadily, compressing its neck with his fingers, while at the same time he urges on the body of the swelling, gradually pushes the protruded parts within the sphincter. In most cases this reduction is easily accomplished. But when it has existed for several days or longer, the coats of the bowel become so much thickened and painful, that the manipulation requires to be conducted with great care and patience. A compress and T bandage will be proper, should the protruding tendency continue in operation.

The prevention of relapse may be accomplished variously, according to the circumstances of the case. If local irritation be the exciting cause, it must of course be removed; and for this purpose different means will be required, according to its seat and nature. If the source of disturbance is a stone in the bladder, it must be cut out; if ascarides in the rectum, they must be expelled by proper medicines; if dentition, the gum must be scarified, and the ordinary soothing means employed; if an unhealthy state of the mucous membrane, astringents, anodynes, and gentle stimulants of a proper secreting action, together with regulation of diet and regimen, will be necessary. While attempts are thus made to withdraw the source of irritation, the patient should be prevented, as far as possible, from voluntary straining, which is apt to continue through habit. With this view, the bowels ought not to be evacuated in the crouching posture usually assumed by children in doing so, as it renders the pressure of the diaphragm most direct upon the contents of the pelvis; and the patient should sit upon a chair so high as may prevent his feet from reaching the ground, to keep the trunk erect, and moderate the force of the expulsive efforts. Care also should be taken to prevent him from sitting too long or too frequently at stool.

PROLAPSUS FROM WEAKNESS.

The protrusion lastly to be considered is nearly confined to old people, especially of the female sex, but may occur at any period of life. It depends upon want of retaining power in the sphincter; and this may proceed from general debility, affections of the nervous system producing paralysis, or a deficiency of strength in the muscle itself. The tumor is usually of a large size, and if it has been permitted to remain long unreduced, so that the coats of the bowel become thickened and unyielding, considerable difficulty may be experienced in the replacement. After this has been accomplished, through

the means mentioned above, the patient should remain in the horizontal posture, with a compress and T bandage carefully applied to prevent removal of the dressings. In other respects the treatment must be varied according to the circumstances of particular cases, with the view of removing or lessening the want of resistance, on whatever it depends; and if relief cannot be obtained in this way, the mechanical support of a bandage may perhaps prove useful.

There is a rare and curious form of this disease which requires to be carefully recognized in practice, as it is apt to appear of an incurable kind, while really very easily remediable; the sphincter, though relaxed and weakened by over-distension, still admitting of a return to healthy action when the obstacle to it is removed. In this case the patient is usually an adult, and the tumor of a large globular or oval form, sometimes invested with a cuticular covering in consequence of its exposure from long and frequent protrusion. The remedy consists in replacing the bowel within the sphincter, and then cutting away the loose redundant skin which surrounds the anus in pendulous folds. Each fold should be seized by forceps and removed by scissors, directed from the circumference to the center of the aperture. The patient is kept in bed for a week or two, and not allowed to evacuate his bowels except in the horizontal posture until the wounds are soundly healed. By proceeding in this way, I have effected complete and permanent relief in cases of the most hopeless character.

[Prolapsus ani may in general be removed by constitutional treatment: it results commonly from weakness, and for which the bowels are *toned* up, the liver stimulated, and the skin made to discharge its proper functions. We should rigidly enforce such habits as do not favor a weakened state of the alimentary canal. Leptandrin, asclepin, and gelsemin, made into pills and given at regular intervals will do much to restore the vigor of the parts concerned, as well as to improve the general health.—R. S. N.]

FISTULA IN ANO.

It does not at first sight seem easy to understand how the disease named *Fistula in Ano* has become so well known to the public, and why the slight incision required for its remedy is still thought worthy of being performed in the theater of a hospital. The mere frequency of the complaint, and the unpleasant nature of its symptoms, do not afford a satisfactory explanation of this; while its hidden seat and the disagreeable feelings connected with it, so far from favoring exposure, must tend to conceal the knowledge of its existence, as well as the means employed for its treatment. In these circumstances, the interest taken in fistula, both by the profession and by the public, can be ascribed only to the well ascertained fact, that the disease does not

admit of remedy except from an operation, which was formerly one of great severity, and even considerable danger.

Louis XIV suffered from *fistula in ano*, and being unwilling to undergo the operation which his medical attendants assured him was necessary, listened to various proposals for curing the disease without having recourse to the knife. Instead of trying these methods on his own person, however, he collected a number of his subjects who labored under the same infirmity, and caused the proposed experiments to be tried upon them. Some of them he dispatched to the waters of Barèges, others to those of Bourbon, and many more he shut up in rooms provided with everything that could be suggested in the way of treatment for the purpose in view. At the end of a year, finding that not a single patient had been cured, his majesty yielded to necessity, and permitted his surgeon, M. Felix, to perform the incisions which he judged proper.

We have here a striking illustration of the necessity of the operation; and the importance attributed to its performance, as formerly practiced, may be estimated from the number of medical men who were present on this occasion, together with the amount of their remuneration. Beside the surgeon and assistant-surgeon, there were two physicians, four apothecaries, and an apprentice, and the sum total of their fees amounted to £14,700.

The inefficacy of all remedial measures for curing fistula except the knife, still remains unquestioned, unless by inaccurate observers or unprincipled empirics;* but the extent to which it must be employed is now happily ascertained to be greatly less than was formerly supposed, and through progressive improvement, it has been at length circumscribed within such narrow limits as hardly to deserve the serious title of an operation. In order to trace the steps which led to this important result, and to understand the true principles of treatment which have been finally established, we must consider the origin of fistula, the causes that give rise to it, the symptoms attending it, and the circumstances which impede its spontaneous cure.

ORIGIN OF FISTULA IN ANO.

In the first place, a collection of matter is formed under the integuments of the hip near the anus, and usually to one side of it. This deposit sometimes occurs quickly, with heat, redness, and pain of the part, at other times slowly and insidiously, without any sign of inflammatory action, so that the first circumstance which attracts attention

* Some of the latter who advertise their ability to cure fistula without cutting, accomplish the object through employing ligatures of silver or lead wire, by a tedious and irksome process.

is a flat and ill-defined swelling that results from the presence of the fluid, together with thickening of the adjacent cellular substance. In whichever of these ways the abscess is formed—and every variety is met with, from the rapidity of a few hours to the slowness of as many months—the matter, if permitted to remain, sooner or later, by inducing absorption of the neighboring textures, makes a way for itself to the surface. As it is situated between the skin of the hip and the mucous coat of the rectum, evacuation may be effected through either the one or the other of these coverings. But in conformity with the general law of progressive absorption occasioned by the pressure of matters foreign to the healthy constitution of the body, the contents of the abscess by far most frequently escape by an aperture through the external integument. This opening is usually very small, often hardly perceptible; and if the cavity be examined after its contents have been discharged, the mucous membrane will be found completely denuded, to more or less extent, at the distance of an inch or a little farther from the anus. As the matter, in order to get into this situation, would, if originally deposited externally to the sphincter, have to penetrate between the muscular fibers, its formation probably takes place in connection with the inner coat of the bowel, whence it proceeds outward, overcoming the obstacles opposed to its progress in this direction, instead of pursuing an inward course, in opposition to the general tendency which leads to the external surface of the body.

If the patient has been previously in pain he feels comparatively well after the matter is evacuated, and may suppose that he is to recover without any further trouble. But the cavity of the abscess, though it contracts, does not become obliterated; the discharge continues of a thin and watery consistence; and the orifice acquires a still greater degree of straightness, at the same time generally projecting from the surface of the skin in the form of a small pimple-like protuberance, at the summit of which it is situated. This appearance is owing to an effusion of organizable matter round the opening, in consequence of the continued irritation which is caused by the discharge passing through it. From the same cause the sides of the sinus acquire an increase of thickness and density, so as to assume the condition which in surgical language is designated fistulous. If the disease be still permitted to pursue its course unchecked, a small aperture is sooner or later formed also through the thin denuded part of the mucous membrane of the rectum. It may seem surprising that this second opening should be formed after the matter has procured vent elsewhere; but there can be no doubt as to the fact, and it agrees completely with what is observed to happen in the case of abscesses situated in the neighborhood of the urethra, which, after their evacuation, whether spontaneous or artificial, often discharge purulent matter

alone for a time, and then urine also. The true explanation in both cases probably is, that the matter, from not escaping with perfect freedom, accumulates in the cavity, so as to cause sufficient pressure for inducing ulceration of the denuded membrane. It is very seldom that a fistula of more than two months' standing will be found not to have an internal aperture.

It happens sometimes, but very rarely, that an aperture is formed in the first instance through the mucous lining of the gut. This constitutes what has been called a Blind Internal Fistula; the other two conditions already mentioned being named the Blind External, and the Complete Fistula. The history of the case, especially the existence of pain and tension in the vicinity of the anus subsiding after a discharge of matter from the bowel, the continuance of such a discharge, and the presence of a flat induration in the hip, with softness and depression in its center, are the signs which lead to the detection of this form of the complaint. However long the fistula may be permitted to continue, no more than one internal opening is formed, but through the occurrence of successive abscesses, the external apertures are occasionally multiplied, and sinuses may extend into the hip as well as the perineum.

Having stated so positively that *fistula in ano* originates in the texture adjacent to the mucous membrane, by the formation of an abscess, which remains entire until after evacuation of the matter, I cannot avoid noticing the very different statement upon this subject, which has been lately published by Sir B. Brodie.*

"I believe that this is the way in which fistulæ in ano are always formed, namely, the disease is originally an ulcer of the mucous membrane of the bowel, extending through the muscular tunic into the cellular membrane external to the intestine; and I will state my reasons for entertaining that opinion. The matter is one of great interest as a question of pathology, but it is one of great importance, as I shall show by and by, in connection with surgical practice. It is admitted by every one that in the greater number of cases of fistulæ in ano there is an inner opening to the gut as well as the outer opening; and I am satisfied that the inner opening always exists, because I scarcely ever fail to find it, now that I look for it in the proper place and seek it carefully. I have, in a dead body, examined the parts where fistulæ had existed several times, and in every instance I have found an inner opening to it. This affords a very reasonable explanation of the formation of these abscesses; it is almost impossible to understand, on any other ground, why suppuration should take place in the vicinity of the rectum more than in any other part of the body,

* Lancet, 26th January 1844, p. 530.

and why the cellular membrane there should suppurate more than cellular membrane elsewhere. Moreover, the pus contained in an abscess near the rectum scarcely ever presents the appearance of laudable pus—it is always dirty colored and offensive to the smell—sometimes highly offensive, and occasionally you find feculent matter in it quite distinct. There is no reason why an abscess simply formed in the cellular membrane should smell of sulphuretted hydrogen; but there is a good reason why it should do so if it be connected with the rectum."

Without inquiring into the theoretical grounds upon which this explanation is founded, I would remark that the point in question is a matter of fact, which readily admits of being ascertained by actual examination. Having made this examination times innumerable, before as well as after avacuation of the abscess, I do not hesitate to affirm, that when a *fistula in ano* is formed, *the mucous membrane always remains entire in the first instance, and is never perforated until after suppuration has taken place.* That the rectum may be injured, as by fish-bones, or other hard substances arrested in it, or by the improper use of an injecting apparatus, and that its contents, thus permitted to escape into the cellular substance, give rise to large collections of putrid matter, it is not my intention to deny. But such events should plainly be considered quite distinct from the spontaneous formation of abscesses giving rise to fistula.

CAUSES OF FISTULA IN ANO.

The process which has been described as leading to the formation of *fistula in ano*, occurs in both sexes, and at every time of life, but is out of all proportion more frequent in males than females, and is comparatively rare before twenty or after sixty years of age. I have operated repeatedly on children for this disease, and more than once on infants only a few months old; but very seldom beyond the age of seventy.

The circumstances which occasion the disease, act either by exciting a predisposing liability to it, or by directly calling it into existence. Of the former, may be particularly mentioned chronic derangement of the lungs and digestive organs, especially the lower part of the intestinal canal. And of the latter, the most important are constipation of the bowels, sedentary occupations, and exposure to cold. It is difficult to trace the connection between pulmonary complaints and *fistula in ano;* but no point in pathology is better established than that there is such a connection; and attention is not unfrequently first drawn to the phthisical condition of a patient by the disposition that he shows to suffer from the disease in question; hence, it has sometimes been erroneously supposed that the discharge of the fistula brings on the

disease of the lungs. As the great intestine is generally found ulcerated in the bodies of those who have died from consumption, it seems probable that the morbid state of this part, and not that of the lungs, is the exciting cause of fistula, but the disease certainly does occur in cases of pectoral affection, which exhibit no symptom of intestinal disorder. Most frequently the cause of the disease cannot be precisely ascertained, and the patient is often not aware of its presence until he happens to notice the discharge of matter which proceeds from it. Among the causes of fistula are sometimes reckoned disease of the bones of the neighborhood, as caries of the sacrum, or exfoliation of the denser osseous texture which composes the ischium. But the fistulous canals in the vicinity of the anus originating from these sources, are not properly classed with a disease which exists independently of any other local cause than its own peculiarity of constitution. They cannot be remedied by the same means as *fistula in ano*, and, when remediable at all, require different treatment.

SYMPTOMS OF FISTULA IN ANO.

Uneasiness about the anus, with a more or less copious discharge of thin purulent matter, staining the linen, and otherwise annoying the patient, are the most constant symptoms of the complaint. The occasional escape of flatus and mucous fluid from the rectum, are generally superadded in the case of a complete fistula. But the passage of feculent matters through the preternatural channel, though often mentioned as a part of the inconvenience experienced, does not usually take place, and indeed is never met with, except when the disposition to the disease is very strong, as chiefly happens in confirmed phthisis, in which case the aperture of the fistula, externally as well as internally, instead of being small and circumscribed by effusion of organizable lymph, is large and flabby. Beside the exudation from the fistula, and more or less uneasiness about the part, especially in going to stool, people of much sensibility are farther distressed by a feeling of weakness and imperfection, which renders their existence almost intolerable. Sympathetic pains, referred to the thigh, leg, or foot, are also sometimes experienced, and have not unfrequently been mistaken for sciatica. There are other persons of a less sensitive constitution, who suffer comparatively little from the disease, and are able for a long while to endure the discomfort which it occasions. As an instance of this, I may mention the case of a gentleman between fifty and sixty, on whom I operated for a complete fistula with two external openings, which had existed for thirty-five years. As has been already observed, the orifice of the sinus is usually very small, and, though generally rendered more manifest by being elevated above the surrounding surface, it still not unfrequently escapes the notice of the patient,

especially as it is apt to close occasionally for a time. Even the surgeon sometimes experiences difficulty in detecting the disease from this source of obscurity; and I have repeatedly operated for a complete fistula, after the patient had been assured that there was no morbid affection whatever in the neighborhood of the rectum. The fluid which is discharged varies both in quantity and quality, being at one time thin and watery, at another thick and purulent. It is often so scanty and limpid, that obliteration of the cavity seems about to be accomplished. But sooner or later the flow is increased; perhaps a new abscess forms, leaving another orifice; at all events, the fistula remains as obstinate as ever, having no natural limit to its existence.

When the fistula opens into the gut, more or less flatus and mucus must pass through it, owing to the resistance which the sphincter muscle opposes to their exit by the anus, and thus adhesion or contraction in the surface of the sinus will be effectually prevented. But when the fistula is not complete, the reason why it should not heal like a sinus in any other part of the body is less apparent. The mere laxity of the texture, or any other peculiarity in the nature of the part concerned, is not sufficient to account for this, since suppurating cavities in the neighborhood of the rectum are known to heal very kindly and readily, as for instance that which results from the operation of lithotomy. When the sinus penetrates, as it almost always does, between the fibers of the sphincter, the obstinacy in question may be ascribed to the frequent motion and separation of the sides of the cavity, which must result from the action of the muscle. But even this obstacle to recovery is not always present, since the fistula sometimes lies quite superficially under the skin and mucous membrane, without passing through the muscular fibers at all. It therefore seems most probable that the detached and denuded state of the mucous coat of the gut is the cause that prevents a healing action.

TREATMENT OF FISTULA IN ANO.

It appears from the records of surgery, that the treatment of *fistula in ano*, until within the last hundred years, was extremely complicated and severe. The induration surrounding the walls of the sinus being attributed to a peculiar morbid action in the part, seemed to admit of no remedy except by destruction or removal; and the cavity itself was thought to require complete division of the gut throughout the whole of its extent affected, with subsequent dressings of the most careful kind. In conformity with these principles, we find that after the patient had been prepared by bleeding, purging, and regulated diet, corrosive sublimate or other powerful escharotics were introduced into the fistula, so as to bring away a slough in the form of a cylinder; that pieces of gentian-root or sponge tent were next inserted to dilate

the cavity, and, by thinning the partition between it and the gut, facilitate the third step of the operation, which consisted in dividing the septum to its farthest extent; and that until the cure was completed, various carefully medicated dressings were daily introduced. Such being the established principles of practice, different practitioners followed out the objects which they kept in view by a variety of methods. Some, instead of the slow and uncertain action of caustic, employed a knife for removing the callosities, either scooping them out at once, or cutting freely through them in several directions, so as to inflict what was deemed sufficient injury to insure their destruction by sloughing or suppuration; some divided the septum between the gut and the sinus by means of knifes, or scissors, or apparatus specially contrived for the purpose, such as what was called the "probe-razor;" and others thought it better to transfix the gut with the needle, so as to include the partition in a ligature of a thread or lead wire.

The treatment thus conducted was not only tedious and painful, but often attended with alarming consequences. Inflammation and constitutional disturbance were apt to follow, and the extensive incisions practiced for the removal of callosities, or dividing the septum of a deeply penetrating sinus, frequently occasioned hemorrhage very formidable, as well from its amount as the difficulty of arresting it. The cure, moreover, was not always complete, a discharge of matter occasionally still continuing, in consequence of the deep wound not healing at the bottom; and we have the testimony of many authors who wrote at the period referred to, that the effect of freely cutting out the diseased parts was frequently so injurious, or rather destructive to the sphincter, as to occasion constipation, and what was equally distressing, though at first sight hardly compatible with it, incontinence of the bowels, their solid contents being retained, and the fluid involuntarily expelled. It is no wonder, then, that *fistula in ano* came to be regarded as a complaint meriting the most serious apprehensions of the patient.

In 1765, Mr. Pott published an excellent treatise on the disease, in which he reprobated the practice of destroying the callosities by caustic, and cutting them out with the knife, which proceedings he considered equally unnecessary and hurtful. He pointed out that the cavity of the abscess, and consequently that of the fistula, resulted not from a loss of substance in the part, but merely from distension of the texture, in which suppuration took place, and that the callosities or surrounding induration proceeded not from any new formation, but from induration of the cellular and adipose textures bounding the cavity. On these grounds, he maintained that, in order to effect a cure, it was not necessary either to take anything away, or to use means for promoting the growth of new substance; that all really

required was to relieve the parts concerned from the continued irritation, which caused and kept up the callous thickening; and that this object could be attained most certainly by simply dividing the septum, "so as to lay the cavities of the gut and abscess into one," abstaining from all escharotic or irritating applications, and using the mildest dressings. For performing the operation, he recommended a blunt-pointed curved bistoury, as the easiest and most manageable instrument.

The soundness of Mr. Pott's principles, the forcible language in which they were expressed, and the authority derived from the public field where he exhibited their practical application, produced a strong impression on his professional brethren, and the treatment of fistula, in this country at least, has ever since been in a great measure free from the objectionable practices formerly in use. As was to be expected, however, many practitioners clung to the methods in which they had been educated; and even in the present day there are some who, whether from imbibing the bad example thus transmitted to them, or from an unhappy peculiarity of judgment, still prefer the old and unjustifiable process of excision. I have seen an eminent professor of surgery in Paris cut out the fistula; and understand that he continues to pursue this practice. Some years ago a middle-aged woman came under my care in the Surgical Hospital, on account of a recto-vaginal fistula, and stated that her complaint commenced with a *fistula in ano*, for which she had had an operation performed by the surgeon of a provincial hospital, who cut something out and laid it on the table, since which there had been a communication between the rectum and vagina. More lately a gentleman from the north of England applied to me on account of some unpleasant consequences resulting from an operation, or rather series of operations, to which he had been subjected, on account of *fistula in ano*. His principal complaint was inability to retain the contents of his rectum, which, notwithstanding the resistance of a carefully constructed bandage, were wont to be suddenly and involuntarly discharged, so as to cause great discomfort, and constant apprehension. Though prepared to find something far wrong, I was not less surprised than shocked, upon inspecting the seat of the disease, to see no appearance of an anus, but instead of it a deep excavation, at the bottom of which the mucous coat of the bowel presented itself to view, completely divested of the sphincter. From these and other facts of the same kind that might be mentioned, I fear it must be concluded, that the plan of excision is still not entirely abandoned; but, feeling assured that those who persist in adhering to it, notwithstanding all that has been said and written on the subject, would not have their views altered by any argument in my power to use, I shall leave them to follow the

progress of improvement at their own leisure, and shall proceed to explain some important steps that have been established in advance of Mr. Pott's practice.

It had been noticed by Sabatier, and other good surgeons, that the internal opening of a complete fistula was generally seated near the orifice of the anus. But in 1820, M. Ribes had the merit of showing * that it was *always* so situated, never exceeding the distance of an inch and a quarter, and often lying considerably nearer the skin. The importance of this observation will appear when it is recollected, that, as the operation essentially requires a complete division of the parts intervening between the two openings of the fistula, unless the internal one be sought for in the proper place, it may escape detection, and thus not only occasion an unnecessarily high section of the septum, but from not being included in the incision, lead to a continuance of the disease. When the internal opening is sought for at the summit of the sinus, it cannot be found, so that the fistula is apt to be supposed incomplete or blind external; and M. Ribes, avoiding this error, ascertained that an internal aperture existed much more frequently than had formerly been supposed. I have ascertained farther, that, in those cases where an internal aperture does not exist, the mucous membrane at the part in which the aperture would be situated if present is not only denuded, but rendered so thin that the perception of a probe through it is hardly less distinct than if it had entered the rectum; and that, if the incision extends to this point, the cure will be no less certain than if an opening into the gut had existed.

In regard to the importance of the principles thus established, I may in the first place remark, that limiting the incision within the narrow bounds, that have now been mentioned, lessens not only the difficulty of its performance, and the suffering of the patient, but also the risk of hemorrhage, and the trouble of after treatment; since, instead of having to keep separate the edges of a deep and not easily accessible wound, the surgeon has merely to prevent adhesion between the lips of a superficial cut. But the operation, while thus simplified in its performance, is also rendered more certain in its effect, since in cases of complete fistula the most extensive incisions will fail to afford permanent relief, unless they include the internal opening. I have, times without number, operated on complete fistulas that had been looked upon as blind external, from the internal orifice having escaped detection through unacquaintance with its position; and the repetition of operations for the disease, which are so frequently heard of in practice, are, with few exceptions, referable to this mistake.

* Quarterly Journal of Foreign Medicine and Surgery. 1820.

In the reports of surgical cases which I have published from time to time since the year 1829, and also in the systematic work on Surgery, of which the first edition appeared in 1831, I have endeavored to explain and impress these principles which have been uniformly acted upon in my own practice. They are still, however, far from being generally adopted, and many writers of high authority continue to inculcate the practice of Mr. Pott. Sir A. Cooper says:* "if the fistula does not open into the intestine you must pass the instrument (a bistoury) up the sinus till it reaches the extremity." "A very copious hemorrhage generally follows the division of the septum," etc. Mr. Copeland says: "In this operation, though there are no vessels of very considerable size in danger of being wounded, yet, when the sinus extends far up the side of the gut, a hemorrhage now and then takes place, either at the time of the operation, but more usually a few hours after it, which, if it be not important from the magnitude of the divided artery, becomes often so from the difficulty, perhaps impossibility, of securing it by a needle and ligature." "I will venture to say, that it (the hemorrhage) has occurred to almost every surgeon who is in the habit of performing the operation." "After many unsuccessful attempts to secure a bleeding vessel under such circumstances, I once accomplished it by introducing a blunt gorget into the rectum; and by keeping the gut thus dilated, I was enabled to see the orifice of the bleeding artery and to secure it."† Mr. Liston says: "Some contend that fistulæ are always complete, that they commence from within, and that the internal opening is always at one particular point; but such, according to

* Surgical Lectures, page 425, 1837.

† The bad effects of dividing the septum to its farthest extent are well illustrated by the following case, which Mr. Copeland has given.

"A carpenter, about thirty years of age, had the operation for *fistula in ano* performed on him in the year 1803. There were two extensive sinuses in the nates divided; but the principal one extended above three inches up the side of the gut, and then perforated it; this also was laid open. There was considerable hemorrhage at the time of the operation; but the patient fainted, and the bleeding stopped; and, when the wound was dressed, he went to bed. After he had been in bed about an hour the hemorrhage returned, and the bleeding artery was so high up the sinus, as to be entirely out of the reach of the needle and ligature; the gut, therefore, and the wound were filled up with compresses of lint, wet with spirit of turpentine; and for some time, it was thought that this mode of compression had succeeded in stopping the hemorrhage; but during our fancied security, his pulse became hardly perceptible, his lips pale, and the whole body was in a cold sweat. He was now supported by wine and other cordials; and in a short time, the hemorrhage burst out again, with as much violence as ever, and continued for more than an hour. All the compresses were now removed, the rectum cleared out as much as possible of coagulated blood, and the wound left without any dressings. The hemorrhage stopped, and did not return again, but very large quantities of coagulated blood were evacuated with the fæces for three days afterward. He was, as may be supposed, extremely debilitated by this loss of blood, but finally recovered his strength, and his fistula was dressed and cured in the usual way."—On Diseases of the Rectum and Anus, pp. 159–161. 3d edition.

my experience, is very far from being the case." "Having reached the extreme depth of the canal, the direction of the instrument's point is changed, so as to apply its cutting surface to the coats of the bowel at that part."*

Having so long contended in favor of the almost constant presence and fixed position of the internal orifice, I am happy to observe that Sir B. Brodie now advocates the same doctrine.

"The first thing to be done is to find the inner opening. I do not say that you will always succeed in finding it—certainly not the first time, but you will rarely fail if you look for it in the right place. Formerly, I often failed, and for this reason—I did not know where to look for it. I used to think that it was to be found in the upper part of the sinus, but it is never found there if the sinus runs high up. You must search for it immediately above the sphincter muscle."†

This was the author's doctrine in 1844, while it had been expressed in the following terms only eight years before, in 1836:—"If the internal opening be at the upper extremity of the sinus, the operation is simple enough; you introduce the fore-finger of one hand into the rectum, and with the other hand you direct the curved probe-pointed bistoury through the external opening into the sinus, and afterward through the internal opening into the rectum; then, keeping the probe-point in contact with the fore-finger, you draw the instrument downward, dividing all the parts below it.

"If the internal opening be anywhere in the middle part of the sinus, you proceed in the same manner; but a second incision is then necessary, to lay open the upper extremity of the sinus. The probe-point of the bistoury must be made to penetrate the tunics of the rectum, before this second incision is made.

"If the sinus has no communication with the rectum, the tunics of the latter must be penetrated as near as possible to the upper extremity of the sinus, the incision being made afterward in the manner which has been just explained."‡

Believing that the principles which I have endeavored to explain are calculated to save much suffering, I think it right to state them in a condensed form.

1. *Fistula in ano* originates from an abscess in close connection with the mucous membrane, but exterior to it.

2. The internal opening is of secondary formation, and does not lie farther from the anus than an inch and a quarter, but is frequently much nearer to it.

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* Elements of Surgery, Vol. iii, pp. 70–82.

† Lancet, 26th January 1844, p. 533.

‡ London Medical Gazette, pp. 183, 184. 1835–36.

3. In external fistula not communicating with the gut, the mucous membrane is always denuded for some extent at the part where the opening would be if there were one.

4. In performing the operation it is merely necessary to divide the parts lying between the external and internal apertures, or the denuded part of the mucous coat corresponding to the latter.

5. In the after-treatment it is not necessary to interpose any dressing between the edges of the wound beyond the first forty-eight hours.

Having thus endeavored to explain the pathology and treatment of fistula in general, I may now consider more particularly the different stages of the complaint.

When the formation of matter in the vicinity of the anus is threatened by the occurrence of pain, hardness, or swelling of the part, it is usual to abstract blood locally by leeches or cupping. Some temporary relief may thus be obtained—but the improvement is neither complete nor permanent, and the progress of the complaint, though it perhaps becomes more slow, is not less troublesome—being rendered sluggish and unmanageable. The application of heat and moisture by means of the hip-bath or fomentations has a very soothing effect on the patient's uneasy feelings, and accelerates the termination of his complaint, either by inducing resolution of the inflammatory action, or promoting suppuration. Evacuation of the bowels should be facilitated by the administration of gentle laxatives, such as castor oil, and injections of warm water into the rectum; and the patient must confine himself to the horizontal posture, as well as the antiphlogistic diet, with strictness in proportion to the acuteness of his symptoms.

So soon as fluctuation is perceived, or the presence of matter may be inferred from the duration of symptoms, the fluid should be evacuated to relieve the patient's uneasiness, and prevent diffusion into the neighboring loose cellular texture, which might be the foundation of troublesome sinuses. The knife is now almost exclusively employed for this purpose, and a free incision is made by it from the hip toward the anus, through the center of the undermined integuments. Poultices are then applied for a few days until the inflammatory engorgement subsides, after which the cavity gradually contracts, and the case passes into the condition of a sinus or fistula. It might be thought better to divide the septum between the abscess and gut in the first instance, and some practitioners have advised this to be done. But it appears that recovery after the operation is not so speedy or so certain when it is performed thus early as when it is delayed until the textures affected are allowed some time to regain their natural state.

In examining a case of fistula with the view of operating, the forefinger of the left hand should always be introduced into the rectum,

while the probe is guided with the other, since unless this be done it is almost impossible to discover either the existence or the position of the internal opening. The probe should be slightly curved, and have its concavity turned toward the opposing finger, which is often able to detect the orifice, or rather the irregular induration surrounding it, and thus assist in directing the instrument. If there is no internal opening, the same exploration will discover the denuded part of the mucous membrane which occupies its place, and equally with it determines the limit of the incision. As the fistula is situated most frequently at the side of the anus, and very rarely either behind or before it, the most convenient position for the patient in general is stooping forward, with the arms resting on a table or chair. But when the orifice happens to be on the left side, unless the surgeon is ambidexter, the patient should be placed on his back with the limbs elevated. Females should lie on their side.

In performing the operation, a knife narrower in the blade, particularly at the point, and less curved than the bistouries in common use, will be found the most convenient. It should be gently insinuated up along the fistulous canal, while the operator's finger in the rectum assists in guiding its direction, and passed through the internal aperture if there is one, or pushed through the mucous membrane if it still remains entire; the point, resting on the finger, is then brought out of the gut; after which, by a sawing motion of the blade, or a steady movement of it onward, the septum is divided almost instantaneously, with little pain, and hardly any bleeding. When much difficulty has been experienced in finding the internal opening, it is a prudent precaution, especially for a surgeon not much practiced in the operation, to push the probe through the sinus, so as to bring its point out at the anus, before using the knife, since it is thus impossible to miss the orifice by transfixing the thin membrane which surrounds it. If any sinuses extend under the integuments of the hip or perineum, they should now be laid open with the knife, and then small pieces of dry lint are placed between the cut edges. This dressing will require to be renewed on the following or second day, when the patient's bowels have been moved, and after this a pledget of lint, moistened with a weak solution of sulphate of zinc, or water alone, and covered with a piece of oiled silk, to prevent it from drying, may be placed over the wound until the cure is completed. A T bandage, or couple of handkerchiefs put on in this form, will enable the patient to keep the dressing applied without confining himself to the horizontal posture, which beyond the first day or two is quite unnecessary. Great attention to cleanliness will be required, and frequent ablution with soap and water contributes not only to comfort, but also to a speedy recovery.

What has now been said relative to the treatment of *fistula in ano* applies to those cases of the disease that admits of remedy, which fortunately constitute a large proportion of the whole. But before determining to operate, or holding out the probability of relief from doing so, it is necessary to ascertain that no obstacles exist likely to frustrate the surgeon's efforts, and disappoint the patient's hopes. The most common of these opposing circumstances, is a phthisical condition of the patient, which, as has been already observed, powerfully predisposes to the disease, and in the event of an operation being performed, is apt either to impede the healing of the wound, or cause a relapse through the formation of new abscesses. Any tendency to this condition, therefore, should render the prognosis in respect to an operation more or less unfavorable, though its performance cannot always with propriety be declined. Patients after exhibiting symptoms of pulmonary disease frequently recover so as to live for many years nearly or altogether free from complaint; and while the issue of their principal disorder is thus uncertain, it would be wrong to withhold the chance of recovery from the minor one, which often occasions more anxiety than the other. The refusal to operate is also apt to cause great discouragement; and the slight incision which has been shown to be all that is necessary for curing the disease, if it has not the effect desired, at least makes the patient more comfortable, by lessening the irritation of the parts concerned, and moderating the discharge. In these circumstances, unless the fatal disease is so far advanced as to render even the slightest surgical interference improper, though the operation for fistula may not with prudence be proposed or urged in consumptive cases, it may be performed if desired by the patient.

Fistulous openings near the anus, and leading into the rectum, sometimes communicate also with the urethra. The origin of this complicated form of the disease is an abscess situated between the prostate gland and perineum, which, from not being evacuated early by incision, discharges its contents into the urethra and rectum, before overcoming the resistance to an outward course, which is opposed by the fascia of the perineum, so that when at length openings do take place in the skin, they are usually situated at the verge of the anus and root of the scrotum. Flatus and thin feculent matter escape by the urethra, urine issues from the rectum, and a copious fetid discharge proceeds from the external orifices. The patient suffers great and unceasing distress, and, unless relieved by efficient treatment, ultimately sinks under the continued irritation and exhaustion.

These formidable consequences of allowing the abscess to open spontaneously, render it incumbent on the surgeon to be careful in his examination for recognizing the disease at an early period, and in giving free vent to the matter, by an ample incision through the integuments

and fascia of the perineum. The disease is generally induced by exposure to cold. It commences with pain in the region of the prostate gland, aggravated by micturition and going to stool, and is attended with more or less fever. When the matter begins to accumulate, difficulty is experienced in voiding the urine, sometimes to the extent of complete retention, and requiring the catheter to be introduced. The patient may continue in this state without any alteration, except the occasional occurrence of rigors, for eight or ten days, or even longer, until the fluid makes a way for its escape. The perineum, when examined, is usually found to be fuller than natural. But, as the integuments retain their ordinary color and consistence, this change may readily escape observation; and fluctuation, owing to the depth of the abscess, can hardly be perceived, unless the finger is introduced into the rectum, through the coats of which the fluid is easily felt. I have frequently been asked to draw off the water when obstructed in this way, without any suspicion having been excited as to the cause of difficulty, and have known the practitioner first take alarm from observing that the catheter contained pus. Examination by the rectum, together with the history of the case, will leave little room for doubt as to the existence of matter. But if there should still be any uncertainty, it will always be right to make an incision in the perineum, since this can do no harm, and the withholding of it exposes the patient to the danger of all the distressing consequences that have been mentioned, as resulting from spontaneous evacuation of the abscess. This incision should be made not at one side, but in the raphe or central line of the perineum, so as to afford a direct as well as free drain for the matter.

When the disease has advanced to its fistulous state, it is necessary to lay open the sinuses; and even then the recovery is not always speedy or complete. The operation should be commenced by dividing the septum between the gut and the cavity left by the abscess. For this purpose the knife is introduced into the orifice which lies nearest the verge of the anus, guided upward until it enters the gut, and then carried outward through the septum, which in this case is generally more extensive than in an ordinary fistula, from the internal orifice being seated higher, even above the inner sphincter. The sinuses which extend between the anus and scrotum are next to be laid open, and then pieces of dry lint are inserted between the cut edges. The deep incisions which are sometimes required expose the patient to the danger of hemorrhage; and if there should be any appearance of this, the bleeding vessels are if possible to be tied, or the wound may be carefully stuffed with lint, the hips being elevated and having cold applied to them. After the cure appears to be complete, a very small fistulous communication is apt to remain between the urethra and rectum,

allowing a few drops of urine to pass occasionally. If this does not close within a moderate time, or proves annoying to the patient by exciting his alarm, a red-hot iron wire should be introduced into the orifice, exposed by a speculum, as often as may be necessary for inducing contraction and obliteration of the slender canal. In all cases of this kind, especially those which have been long established, it is proper to search the urethra for stricture; since this additional complication is not unfrequently met with, whether as a cause or consequence of the fistula it is not always easy to determine.

Fish bones and other bodies of a similar form are occasionally arrested in their passage through the alimentary canal by the *sphincter ani*—and may then penetrate the coats of the gut, so as to cause the formation of an abscess, which of course will not admit of being healed so long as the irritating substance remains. It is only by examination with the probe or finger that this complication can be discovered—the patient seldom being aware of having swallowed anything improper, or at all suspecting the cause of his complaint. When the nature of the case has been ascertained, the fistula should be laid open in the ordinary way; and then, if necessary, more extensive incisions may be made to permit extraction of the foreign body without violence, or tearing of the surrounding parts.

Fistula in ano is sometimes found associated with stricture of the rectum, and in this case has been attributed to the resistance which is opposed to the passage of the contents of the rectum by the preternatural contraction of the gut. If so, the orifice ought to be situated higher up than the stricture; instead of which it occupies the usual position, about an inch from the anus. If the stricture, therefore, has any share in causing the fistula, it must act merely by exciting irritation in the neighborhood. In regard to the performance of the operation, the presence of a stricture does not require any deviation from the usual course of proceeding; but the recovery of the patient will of course depend upon the practicability of restoring the rectum to its natural capacity and texture.

The abscesses which result from the *Morbus coxarius*, or hip disease in its advanced stage, generally open in the lower and back part of the hip, but those which proceed from caries of the sacrum, and those connected with exfoliations from the ischium or pubis, discharge their contents near the anus, so as to present the appearance of ordinary fistula at this part. It is obvious that, if the sinus depends upon caries, it will not be benefited by any extent or number of incisions, and that if it leads to an exfoliation, the detached portion of the bone must be extracted as an essential step to recovery. Many years ago I was asked to see a young man who had suffered repeated operations for what was supposed to be *fistula in ano*, without obtaining relief,

and had at length become so much exhausted as to have lost all hope of recovery. A careful examination led to the discovery of an exfoliation lying inclosed in a capsule of cartilaginous firmness, formed by the origins of the flexor muscles of the knee, from the tuberosity of the ischium. After the extraction of this piece of bone, the patient quickly recovered, and completely regained his strength. More lately I saw a young woman who had suffered from *fistula in ano* for five years, and wished to have the operation performed. On introducing the probe I felt it grate past a hard surface, and extracted a thin scale of bone, which had probably been detached from the arch of the pubis, as she attributed her complaint to a strain sustained in hastily descending from the roof of a coach.

[Perhaps in no one particular have the Eclectic physicians of this country so signally triumphed over the Allopaths, as in the treatment of *fistula in ano*. It is an admitted fact that operations often signally fail, and when we think of the object of the operation, and the nature of the tissue to be removed from the canal before it can be obliterated, we may very naturally presume that there is a much surer way to effect the end in view than by the knife. The plan of curing *fistula in ano* here recommended, originated nearly a quarter of a century ago with Dr. W. Beach, and was fully established by the late Professor Morrow of this city. Since then it has been variously modified; but the main features are the same.

TREATMENT OF CONFIRMED FISTULA.

The first thing is to ascertain as precisely as possible the magnitude, direction, and the number of sinuses.

The *probing*, however, for this purpose may have to be delayed in consequence of the irritable condition of the parts. In such a case, make use of the bitter herb fomentations two or three times a day, together with emollient poultices. Keep the patient perfectly quiet. The bowels should be gently moved by the compound powder of senna, or some other mild hydragogue.

After a short time, under measures of this kind, the patient will be able to bear the operation of probing, though it may even then be quite painful. Having thus ascertained the state of the case, if the fistula be already "complete," and large, and direct enough for your purpose, *arm* a common silver probe with your *ligature*. For this purpose, the best material is saddlers' silk, doubled. Pass your threaded probe from the external to the internal orifice. When it is through, turn the outer end a little upward, that the other may be seized by your finger in the rectum, and the string brought down. By separating the nates, you may be able to see the end of the probe and ligature; or

the rectum may be dilated, and the operation facilitated by the Speculum Ani.

The two ends of the ligature are to be *tied* as firmly as the patient can bear, and afterward drawn a little tighter every day. This *tightening* is commonly effected by rolling on or twisting with a piece of wood. A better plan—and which has received the highest encomiums from the profession generally—is, before tying, to let the ends of the string pass through a large vial-cork, separating three-fourths of an inch where they emerge, and passing over a little wooden roller, fitted to radial grooves cut on the end of the cork. These notches will hold the stick, after turning or twisting, like the fall of a windlass. The surface is thus less irritated, the pressure of the cork being more equable than any "toggle" fixed there.

Fig. 119.



If there are several sinuses, they should all, or the principal ones at least, be treated in the same manner.

While the ligature is on, the parts should be fomented every day, and every sinus thoroughly injected two or three times a day with our usual alkaline lotion. The caustic powder should also be inserted, by means of pledgets of lint. These must be "crowded in," and allowed to remain till the next dressing, that the caustic may gradually dissolve, and have its proper effect upon the cartilaginous growths.

As soon as the ligature has *cut* its way completely *through*, foment and poultice, continuing the caustic applications, completely filling whatever fissure may remain with the armed tents. Every part will then rapidly heal, the caustic causing no impediment to the process, but rather seeming to stimulate to a more healthy and rapid *granulation*. When the restoration is nearly complete, and but little matter is discharged, the parts feeling soft and natural, the poultice and fomentations may be dispensed with, and the black salve, or some other simple dressing, substituted.

There is no danger from this course to the sphincter muscle; the healing process, as was before remarked, following up the ligature, and being generally nearly complete before it comes away. It is sometimes even necessary to prevent this, and keep the fissure open until the proper dressings have removed all callus; after which it can always be readily healed up.

Should there be other sinuses branching from or leading into the main one, they must not be closed until all callosity at their extremity or along their course has disappeared, and the parts seem natural to the touch, and without soreness. Enlarge all such branches by the

armed *tents*. These are best made of hemp-cord, well charged with the caustic, after being moistened a little, and retwisted of the size required. The size should be increased, as the orifices of the pipes permit, being careful to keep the original sinus well distended while you are dressing the others. These measures must be every day repeated, until all appearance of callosity has gone, when milder dressings may be made use of, and the parts allowed gradually to heal.*

It is not always desirable to close the orifice at once, for the disease may be, and very often is, associated with phthisis pulmonalis, and the system must be allowed to gradually accustom itself to the change consequent upon the suppression of the discharge. The sulphate of zinc seems to have a peculiar property in destroying the cartilaginous lining of the tubes, and where free suppuration has thus been set up, there need be no failure in effecting a cure.

The following article by Prof. Z. Freeman, is fully expressive of my own mode of treating fistula in ano, and exhibits the value of the ligature in the treatment of that disease:

By referring to the different text-books on surgery, and treatises on this subject, one may get excellent descriptions of this disease; and as I am constantly treating it in some of its most severe and obstinate forms, a few remarks in regard to it may not be amiss.

Fistula in ano may be incomplete internal, opening into the rectum and not communicating externally, incomplete external, opening at or near the verge of the anus, without communicating with the cavity of the rectum, and complete fistula, communicating between the cavity of the rectum and the external surface, near the anus, in the perineum or on some portion of the buttocks.

The internal opening may be at the verge of the anus, or six lines or two inches above. The highest that I have treated, has been two inches from the verge of the anus. The external opening may be by a single aperture or more, but so far as I have had a chance to observe (and my opportunities have been quite extensive), I have never seen, excepting two cases, more than one opening into the cavity of the bowel.

The course and extent of the fistulous canals vary. Some are nearly straight from the opening in the gut to the external surface; some pass one-fourth, half or two-thirds around the bowel, and then, after forming a large pouch or excavation, go directly to the surface. Others, burrowing deeper into the adipose tissue around the rectum, pass around the border of the levator ani, or sphincter muscle; or, continuing along the border of the gluteii muscles, or passing under

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* Eclectic Surgery.

the gluteus maximus, form an abscess there, which points and opens through it, discharging its contents, thus making a long and tortuous canal. Others pass into the perineum and open at various points, as they approximate the surface. Sometimes we find an opening into the gut communicating with one on the right side of the posterior perineal space, near the coccyx—this continuing to the left side, and opening opposite and communicating with other openings.

This disease may originate from various causes, but I believe most frequently from hemorrhoids. One case that I treated was caused by a fall upon the buttock, which bruised the soft parts in the vicinity of the rectum; another by a punctured wound from a splinter of wood; another from hemorrhoids, another from irritable rectum and stricture, etc. When caused by hemorrhoids or stricture, it generally pursues the following course: The surface of the rectum becomes abraded from ulceration, or rupture of a distended hemorrhoidal vein, and the ulceration continues progressing through the gut. The inflammation extends in advance of the ulcer, and around it, inducing a deposition of plastic lymph, which thickens the parts, becomes organized, and in time indurated. The ulceration continues excavating the muscles, by burrowing in the adipose tissue, and forming one or more abscesses, until at last it points and opens upon the external surface. After the pus has discharged, the abscess and canal which correspond to the course of the ulcer, contract into a fistulous tube with an indurated wall, and lined by an epithelium composed of plastic lymph, which has become organized upon the surface of the granulations. This epithelium secretes a sero-purulent fluid, which lubricates the surface, and prevents adhesion between the walls of the fistulous tube. As long as this secreting surface is not changed, so long will adhesion between the surfaces be prevented, and if any portion of the canal is prevented from adhering, the secretion from its surface will form the nucleus for an abscess. Sometimes the fistulous canal extends to the coccyx and sacrum, inducing disease of those bones.

Treatment.—The treatment consists in the introduction of a ligature through the fistulous opening into the bowel, tied upon the outside, and every few days tightened, until it is cut through; then disorganizing the tube and the indurated mass which surrounds it, until the parts are of a normal density, and then healing the wound by the suppurative process.

The method of cure used by many, is to pass a probe-pointed bistoury through the fistula into the bowel; then introduce the finger oiled into the bowel, seize the point of the instrument, draw it down and cut the whole mass through (cutting out as much of the tube as the hemorrhage will allow), and then attempt to heal it. In a few cases this course has succeeded; but this leaves the indurated mass

and the lining membrane, which are morbidly sensitive, to annoy the patient with pain, and the burrowing secretion to form an abscess; and thus the parts do not heal, or if they should close, they soon re-open, which accounts for the common saying that fistula in ano cannot be cured. The course suggested above entirely eradicates the adventitious tissues, leaving the parts in a normal condition.

My treatment will be better illustrated by reporting a few among the many cases that I have treated successfully (and I presume that my success has been as general as that of any surgeon west of the mountains).

Case I.—Mr. H., Covington, Ky., fell from his horse three years since and injured the rectum. Abscess and fistula formed, which were extremely painful. His medical attendant not being satisfactory, was discharged. I found two external fistulous openings communicating with a large abscess, and the latter within the cavity of the rectum, nine lines above the verge of the anus, the parts extremely sensitive and much indurated, and the patient very feeble and emaciated. I injected the sesq. carb. potass. in solution (twenty grains to an ounce of water), for a few days, to disorganize the morbidly sensitive surface. I then introduced a strong silken ligature, by means of a common silver probe, through one of the external apertures into the bowel, and another between the external apertures, and by tying them tighter every day, the parts included became strangulated and absorbed, and the ligature sloughed through, making a complete external communication between the opening in the bowel and all the external apertures.

I used poultices of *ulmus fulva* and anodynes to arrest the pain. I then applied the sulphate zinc to the indurated walls of the fistulæ once in three days. There were also three blind fistulæ, two extending into the perineum, nearly meeting around the external border of the sphincter, and one extending toward the gluteii muscles. In fact, the inflammation had extended to such a degree, as to cause extensive deposition of fibrin at different points in the part, which had become indurated, and communicating with each of those hardened masses was a fistulous pipe. These I had to disorganize, and when they were destroyed, they resembled a piece of disorganized tendon. Wherever a portion of this was left, the part would not heal, so I disorganized it all, until the parts were normally soft and sensitive, and then healed the wound.

I alternated at times the sulph. zinc with the sesq. carb. potass., kept the inflammation down with the elm poultice, and healed the part with Meyer's ointment.

In this fistula, lying by the side of the rectum, I found a fine

splinter, two inches in length, and one line in diameter. My patient had no knowledge of how it came there.

Case II.—Mr. H., from Alabama, three years since, contracted fistula in ano, which was operated upon twice by surgeons in his neighborhood. The parts closed, but did not heal soundly. One year afterward, I commenced treating him. There was one opening into the rectum, one inch from the verge of the anus, three in the posterior perineum (one on the right side and two on the left, the right and left sides communicating with each other). The whole region of the lower rectum seemed excavated, while pus would gush from the openings on pressure. There was a great deal of induration in the perineum, especially along the cicatrices, which were morbidly sensitive. I injected a solution of sesq. carb. potass. (*i. e.* grs. *x* to water ℥j), for a few days, then applied the ligature as in the case above. After the parts were opened, the excavation was so extensive, that four fingers could be laid in it. The whole sides and edges of the incision were indurated and morbidly sensitive. I applied zinc sulph. to the whole surface, using it on one part at a time, until the whole surface was disorganized. I kept this discharging and granulating until the indurated mass had disappeared, and it seemed normally soft and pliable; then by a compress, I approximated the sides slightly, and healed the wound by granulations. I have seen him since, and he is entirely well. There is no induration in the vicinity of the cicatrix.

Case III.—J. S., Ohio, aged twenty-four, was attacked with hemorrhoids near two years since. These continued about six months previous to detecting the fistula, which continued until I saw him five months since. At that time there was an opening through the rectum about two inches from the verge of the anus, and about four lines in diameter, which was still ulcerating. This communicated with three external fistulous openings; two in the perineum, one eighteen lines from the verge of the anus, and the second one inch anterior to this. The third opening was through the center of the gluteus maximus muscle. Previous to these opening, they formed large abscesses both in the perineum and on the buttocks. The sphincter ani, the perineal fascia at that point, and a large part of the gluteus maximus muscle, extending from the fold of the nates to its center, were excavated; the walls of the abscess and fistula indurated and morbidly sensitive, and the whole discharging sanious and ichorous pus. His general health was good, excepting the constitutional effects of the fistulæ.

Treatment.—Injected into the fistulæ ℞ sesq. carb. potass. grs. *xx*, water ℥j, M., once per day for three days; applied an elm cataplasm, until the inflammation had disappeared and the parts were less sensi-

tive; then passed a ligature of firm silk through the perineal fistulæ into the rectum through its fistulous opening, and tied it tight. (This was difficult to pass on account of the fibers of the transversalis and sphincter ani muscles interfering.) By tightening the ligature every two or three days, and subduing the inflammation with the elm poultice, I laid open both perineal fistulæ and the lower end of the rectum, cutting off the sphincter ani muscle. I then applied pulv. zinc sulphate to the indurated mass, crowding it in upon cotton, until the whole was disorganized; then I applied the elm poultice and sloughed off the eschar. By this method I disorganized the connecting fistulæ, and when the tissues presented a normal appearance (the induration having disappeared), I healed the wound as in the above case. I injected zinc sulph. in solution into the gluteal fistula, and as it connected with the others previous to entering the gut, its indurated walls soon became disorganized, and it healed with the others.

Upon severing the sphincter ani with the ligature the patient was unable at times to retain flatus; but by keeping the bowels costive and allowing the parts to heal behind the ligature, before the sphincter was cut entirely off, prevented him from losing its entire use. While the ligature was still in the fistulæ, I crowded sulphate zinc into those openings to disorganize the indurated walls, so that the parts behind might heal as the ligature cut through the sphincter.

May 5.—Mr. J. S., is now well, sound in health, in excellent spirits, and has been discharged over six weeks.

Case IV.—Mr. W., aged thirty-three. Fistula in ano. Commenced two years since from irritable rectum. Eight weeks since I commenced treating him. At that time he had two openings in the rectum, one near the verge of the anus, and the other about two inches up the rectum; both communicated with distinct external openings, and burrowed among the muscles and fascia. The parts were much indurated and extremely sensitive from the morbidly irritable rectum. The bowel was strictured, and it was with great difficulty and pain that he could pass any fæces, having but one discharge per week, and that producing an attack of chills and fever, with severe headache. I inserted the ligatures through both openings into the bowel, cut through the parts inclosed, by tightening them, and applied pulv. zinc sulphate to their indurated walls. The irritability of the rectum was subdued by injections of a mild solution of the sesq. carb potass., and the application of anodyne and emollient poultices. The parts are now healing finely, the stricture has nearly disappeared, and from appearances, he will soon be discharged cured.

Case V.—J. P., double perineal, gluteal and rectal fistulæ, also an opening at the lower border of the gluteus maximus muscle. All

those openings communicated with an opening into the rectum, two inches above the verge of the anus. There was also an opening at the border of the gluteus maximus muscle, opposite the middle of the right border of the sacrum. All those openings communicated with each other and completely excavated the right side of the buttocks. The parts were much indurated and very sensitive, while collections of pus would form and then exude from the different apertures. His bowels were extremely costive, and he was confined to his bed from local pain and the constitutional effects of the disease. Ligatures were passed through all of these fistulæ; some were cut out by them, and sulph. zinc applied to the indurated walls, while the others were injected with it, and the powder drawn into them upon the ligatures. The inflammation was subdued as that of the others. Some of the fistulæ healed, and the others were healing fast when he left. He became able to walk about the city as usual, and I have not heard from him since.

I report these few out of many cases, to show the excellent result of the ligature practice, and the necessity of disorganizing the indurated fistulous walls, and softening the parts in order to heal them soundly, and in using the ligature for severing the sphincter muscle, you should disorganize the wall behind, and let the parts heal after the ligature. This practice preserves the function of the sphincter ani, although it may be weak for two or three months after the parts have healed.

The old practice of severing the sphincter with the bistoury is objectionable, for it frequently and nearly always destroys the function of that muscle, inducing disagreeable incontinence of the flatus and fæces.

I do not use the cork and lever, so highly recommended by others, but tie and untie the ligatures, also tightening them with two pairs of dressing forceps—this is an easy and handy method.

I have treated many cases upon the same basis, and my experience corroborates that of Prof. Freeman.—R. S. N.]

RETENTION OF URINE.

1. *Retention from deficiency in the expulsive power of the Bladder.*

The urinary bladder may be weakened in various ways, so as to effect the evacuation of its contents imperfectly, or not at all. Mere inordinate and long-continued distension, by overstretching the muscular fibers, destroys, more or less completely and permanently, the contractility of the organ, and in a corresponding degree renders the patient unable to void his urine. When the retention is complete, the bladder is distended until it contains several pounds, and forms a large tumor, which may be seen and felt in the hypogastric region. The cellular and other tissues then resisting farther extension, the

ureters and pelvis of the kidneys are distended, after which the secretion of urine, being opposed by the pressure of that already accumulated, the patient's state remains without much alteration, until evacuation is effected artificially, or takes place through ulcerative absorption of the coats of the bladder. In this state the patient suffers inexpressible distress from a constant desire to empty his bladder, and from the incessant efforts, violent but abortive, which it induces him to make. Small quantities of water dribble away by drops from time to time, as the secretion slowly proceeds, but the tumor suffers no diminution of size or extension. Exposure to cold or wet, and injuries of the spine, give rise to the same powerless condition of the bladder; and if there be any mechanical obstacle to excretion previously existing, as from stricture of the urethra, swelling of the prostate gland, or tumors pressing on the canal, or if the expulsive power of the bladder be weaker than usual, this effect is still more readily produced. In old age the bladder is apt to lose its tone, and expel the urine imperfectly. The patient observes that he makes water more frequently than before—that he does so in smaller quantity at one time—that the stream is not forcible, but small and dribbling—and that he passes more or less of it during his sleep. It is the last symptom which generally first attracts notice, and leads to the more careful attention that detects the others. The obvious explanation of it is, that the bladder never being fully emptied, but merely having the excess expelled, which its feeble power, aided by the compression of the abdominal muscles, is able to command, and becoming distended beyond this extent during sleep, while the resistance of the voluntary muscles at the neck and membranous part of the urethra is no longer opposed to its evacuation, the water flows away gently without awakening the patient.

The treatment of this palsied state of the bladder, whatever be its cause or degree, absolutely requires, in the first place, that the water should be drawn off, since it is only by being allowed to contract that the muscular fibers can recover their usual power. This is effected by introducing a catheter, which may be either flexible or rigid—the former being made of elastic gum, and the latter of silver. Unless there is reason to suspect some morbid alteration in the width or direction of the urethra—the mode of discovering and treating which will be explained hereafter—an instrument should be selected equal in size to the ordinary width of the canal. Different surgeons prefer different curvature of the catheter; but it may be observed in general that it is passed most readily when the bent part is short. The patient should be laid reclining, or made to stand erect, with his back supported. The surgeon holding the penis between the thumb and fingers of his left hand, introduces the point of the catheter, lubricated with oil, into

the urethra, and pushes it gently onward, at the same time stretching the penis. Until he reaches the bulb, which is about six inches and a half distance from the orifice of the extended urethra, it is of little consequence in what direction the curvature of the instrument is held; but, provided the passage is sound, if he occasions pain, or uses force, or presses so as to make the point project on any side, awkardness may be inferred. The easiest mode for a beginner in executing this part of the process is, to hold the handle of the catheter parallel with, and near to, the parietes of the abdomen, in the direction of the *linea semilunaris*, and press on without any alteration of position, until the point arrives at the bulb. He then relinquishes his hold of the penis with the left hand, applies the points of its fingers to the perineum at the verge of the anus, and bringing the catheter into the direction of the mesial plane, withdraws the handle from the abdomen, so as to make the point ascend from the dilatation at the bulb, into the more narrow membraneous part of the canal. By simply continuing to depress the handle, and supporting the perineum, or introducing his fore-finger into the rectum, so as to elevate the point more effectually, he conveys the catheter fairly into the bladder. A surgeon, who is practiced in the operation, will find it more convenient, especially when the patient is standing, to introduce the catheter as far as the bulb with the convexity upward or toward the pubis; and then, by making the handle describe a semicircle, steadily turn it into the same position, as when passed thus far the other way. The subsequent part of the process should be conducted in the manner which has been already explained. The danger to be dreaded, in performing this operation, consists in forcing the point of the catheter through the lining membrane of the urethra, into the spongy texture which surrounds it. The false passages thus made occur most frequently about four inches from the orifice, owing to the handle of the catheter being too soon depressed — at the bulb, from its not being depressed sufficiently, whence the point is pushed between the membranous part of the urethra and the rectum — and just before entering the neck of the bladder, from the point not being sufficiently elevated while urged forward, which forces it into the substance of the prostate gland. Attention to these sources of error will guard the surgeon against making false passages, and enable him to avoid them if already formed.

It seldom happens that one evacuation of the bladder is sufficient for the patient's recovery. He feels completely relieved at the time, but soon begins to suffer again from the symptoms of distension; as the bladder, even when in the soundest state previously, is slow in regaining its contractile power. The catheter, therefore, must be introduced once or twice a day, until it ceases to be required; and the

tincture of the muriate of iron may be given alone, or together with *Uva ursi*, from time to time. If the cure should never be completed, as in cases where the palsy arising from distension is complicated with the weakness of old age, it will still be right to draw off the water regularly at bed time, to prevent its involuntary discharge during sleep.

[It will be essentially necessary to administer such tonics as will increase the contractibility of the muscular fibers, for which purpose the phosphate of iron will generally be the best, inasmuch as the nervous system is generally very weak in performing its functions. Gelsemin and hydrastin will also prove to be good tonics.—R. S. N.]

2. *Retention of Urine from Irritation and Spasmodic Contraction at the Neck of the Bladder.*

When the ordinary resistance to the passage of the urine is increased by inordinate contraction of the muscles, which in the healthy state oppose the expulsive power of the bladder, the fluid is retained, and gives rise to the same symptoms as in the former case, but generally in a very acute form. The muscles concerned in producing this effect are the sphincter of the bladder, and Wilson's muscles, which descend from the pubis and embrace the membranous part of the urethra. The causes which excite their excessive action are irritations, sometimes indirectly applied, as those proceeding from exposure to cold, the use of stimulating food or drink, or the employment of cantharides; but more frequently of a local kind, as from inflammation of the extremity of the urethea, spreading back toward the bladder, or from the injurious effects of instruments introduced into the canal. If these circumstances operate on a person whose urethra is previously diseased, and more especially if it should be already contracted from any cause, the retention of urine will of course be more readily and completely induced. From the nature of the exciting circumstances, it may be inferred that, along with the muscular constriction, there is a thickening of the mucous membrane, depending on vascular engorgement, which contributes to the effect, and must be kept in view during the treatment.

As the disease depends on irritation, soothing measures ought always to be employed in the first instance, mild and anodyne injections thrown into the rectum, the hip-bath, and venesection, if the pulse should require it, often prove sufficient to afford relief. Should they fail in doing so, and the symptoms be urgent, it will be necessary to draw off the water by the catheter, since the additional irritation thus occasioned is more than counterbalanced by the good effect of emptying the bladder, which, when stimulated by distension, reacts upon the spasmodically contracted muscles at its neck, and increases

their resistance. The instrument used on this occasion should be neither full-sized, as the urethra is not only compressed by the muscles, but also swollen and contracted, nor very small, as the excited and congested membrane is softer, and, consequently, more easily torn than usual. It should be passed very gently, and with great care to avoid the erroneous directions of its point, which have been mentioned above, and in this case are extremely apt to occasion breeches, that increase the difficulty of the operation, by exciting still more irritation, by causing hemorrhage, and by misleading the surgeon in his future attempts. The relief afforded by evacuation is seldom permanent, the irritated state of the organs giving rise to a deceitful feeling of distension, and rendering the patient very soon desirous of having the catheter again introduced. To obviate these uneasy symptoms, an opiate injection ought to be thrown into the rectum immediately after the instrument is withdrawn; and the operation ought not to be repeated oftener than there may be reason to suppose that the urine has accumulated to an injurious extent. To counteract the constipating effect of the opium injection, and remove any source of irritation from the intestinal canal, a tablespoonful of castor oil should be given every day or two, according to circumstances. The food of the patient should be of the least stimulating kind; and he should drink freely of mucilaginous diluent fluids, such as barley-water, containing small quantities of carbonate of soda, nitrous ether, or camphor mixture. Bodily fatigue and exposure to cold must be strictly avoided.

STRICTURE OF THE URETHRA.

Strictures of the urethra were formerly attributed to fleshy excrescences obstructing the canal, and spasmodic contraction of the fibers lying in the substance or on the external surface of the urethra. It is now almost universally admitted, that they invariably depend upon narrowing and thickening of the lining coat, from lymph being effused and organized in its interstices. There is thus produced a constriction, varying in tightness from the slightest perceptible diminution of capacity to almost complete closure, and in extent from the breadth a thread to the length of an inch or more. In some very rare cases the stricture has been found on dissection to exhibit what is called a bridle form, there being a fibrous band stretched across from one side of the canal to the other, in consequence, no doubt, of lymph having been effused into the interior of the canal, and organized there. The most common seat of stricture is at the bulb, about six inches from the orifice. The one next in frequency is at the part where the penis bends upon itself when pendulous, which is about three inches and a half from the orifice. The other situations particularly exposed

to its occurrence are the neck of the glans and orifice of the urethra; but the whole extent of the canal anterior to the prostate gland is subject to the disease. Two or more strictures are often met with in the same urethra, but when this is the case, one of them is almost always at the bulb, and in general proves the most confirmed of the whole. The cause of strictures cannot often be positively ascertained. There can be no doubt that a very large proportion of them occur subsequently to gonorrhea, but whether this be in consequence of the disease, or the means employed to remedy it, admits of question. It may safely be stated, that inflammation, or at all events excitement of the urethra, precedes the adhesive process which establishes the thickening and induration, and whatever tends to produce this condition of the membrane will expose to the risk of stricture. Severe gonorrheas, in which the inflammation spreads back along the urethra, irritating injections, allowed to enter the passage too far, frequent indulgence in venery, stone in the bladder or other parts of the urinary organs, and habitual addiction to a diet that stimulates the parts concerned, may thus be regarded as causes of stricture.

Beside this true organic stricture, some believe in the existence of a temporary constriction, depending on spasmodic contraction of the urethra. The circumstances which are supposed to afford evidence of spasmodic stricture, are the sudden invasion and disappearance of the disease, its connection with mental agitation, and the tightness with which instruments introduced into the canal are sometimes felt to be embraced when an attempt is made to withdraw them. Mr. Wilson accounted for these facts by referring them to the operation of muscular fibers lying along the urethra; but few anatomists have recognized these fibers; and even granting their existence, the longitudinal direction ascribed to them does not agree well with their alleged effect. Sir Charles Bell and others attribute the sudden alterations that are observed in the width of the passage to the action of the perineal muscles, and it is certain that the membranous part of the urethra is distinctly under their influence. But the whole extent of the canal manifests occasionally a contractile power, and such a limited source is, therefore, not sufficient to account for it. It seems, on the whole, most probable that the turgescence of the mucous membrane itself, or the erectile tissue which immediately invests its external surface, is the principal cause of the phenomena that have led to the belief in a spasmodic stricture. In an irritable state of the parts or system, the effects thus produced may be expected to be more remarkable than usual, and in the case of a real organic stricture existing, they will aggravate the symptoms of the disease.

The symptoms of stricture are: 1. Difficulty in making water, owing to the resistance which is opposed to its escape by the narrow part or

parts of the canal. The bladder, therefore, is slowly emptied, and its muscular coat becomes greatly thickened, so as to present an appearance similar to that of the ventricles of the heart on their inner surface. 2. Small size of the stream, which is usually spiral, forked, or dribbling. 3. Pain, generally experienced during micturition, and seldom afterward. 4. Frequent desire to evacuate the urine, which is most remarkable during the night, from the circumstance of persons in health not requiring to do so between the time of lying down and getting up. The patient also often complains of pain *in coitu*; of a thin gleety discharge from the urethra; of swelling and pain of one or both testicles; of uneasiness about the loins and limbs; and of muscular weakness of the latter. He sometimes suffers feverish attacks of short duration, but considerable intensity, resembling in all respects the fits of an ague. It is observed, that the severity of all these symptoms increases when the patient is subjected to irritation, whether general or local, and diminishes in opposite circumstances.

A very distressing and not unfrequent consequence of stricture in the urethra is abscess, followed by fistula of the perineum. The canal is always much dilated behind the contracted part, and sometimes suffers perforation from ulcerative absorption, which allows the urine to enter the cellular substance, not suddenly, but gradually, and with a preceding effusion of lymph that limits the extent of its diffusion. The irritation thus induced gives rise to inflammation and suppuration; and the abscess which results opens sooner or later through the integuments of the perineum. Instead of being formed by this process, the abscess is more frequently called into existence merely by the irritation resulting from the stricture, which excites inflammation and suppuration in the cellular substance, or glands adjacent. In either case the result is the same; and a sinus is formed, leading from the urethra, generally the membranous part of it, to the surface of the perineum. The urine, in a larger or smaller proportion, passes through this preternatural canal, the parietes of which, owing to the continued irritation thus produced, become thick and hardened, so as to resemble cartilage. The urethra becomes more and more contracted; new abscesses are formed; the number of sinuses is increased; and, at length, the whole perineum is perforated with openings, which discharge pus mixed with urine, and the seminal fluid also if it happens to be ejected; while all the neighboring parts are not only thickened and indurated, but almost constantly inflamed, and engaged in the formation of abscesses.

The treatment of stricture has been conducted on various principles, the different modes of practice founded upon which, and their relative advantages, it is not necessary to consider particularly, since one of them is decidedly preferable to the others. The methods referred to

may be arranged under the three heads of Caustic, Incision, and Dilatation. Caustic has had the support of many powerful advocates. Wiseman proposed it so long ago as in his day, under the supposition that the disease depended on the growth of fleshy excrescences from the inner surface of the urethra. John Hunter recommended it for destroying the callous contracted state of the canal, which he more correctly regarded as the cause of obstruction. Sir E. Home, Lallemand, and other surgeons of recent times, have earnestly supported it by their practice and writings. But from having been generally followed, it has now, in this country at least, fallen almost entirely out of use, which is not surprising when its disadvantages are considered.

The mode of application usually employed was to insert a bit of lunar caustic, or potass, into the extremity of a wax bougie, and fix it in its place by pressing down the edges of the excavation made for its reception. The bougie was then passed quickly down to the stricture, the seat of which had been previously ascertained, and allowed to remain pressed against the obstruction for a few seconds, so as to let the escharotic effect be produced. The operation being repeated as frequently as the irritation induced by it permitted, at length enabled a full-sized instrument to pass. It may be readily imagined that the process of cure, thus conducted, was necessarily very tedious, painful, and dangerous. The successive applications of the caustic required intervals of several days, and the cure was seldom completed without very many operations of this kind; sometimes a hundred or more. The irritation produced by the caustic not only excited excessive pain, but subjected the patient to the risk of complete retention of urine, swelled testicle, and other bad consequences; and if the caustic happened to drop out of the bougie, violent inflammation, with various injurious effects on the neighboring parts, abscess of the perineum, etc., were apt to be induced. Modern improvements in the apparatus for applying the caustic have in some measure obviated these objections. Instead of being carried down to the stricture by the simple but insecure means above-mentioned, it has been introduced into the strictured portion of the canal more accurately, safely, and efficiently, by various instruments, constructed on the following principle. A catheter, straight or curved, of full size, has a small perforation in its round extremity, to which a wire is fitted, so that when pressed at the handle or mouth of the instrument, it may be caused to project. This wire has a slit a little way from the point for receiving the caustic, and when thrust out at the opening of the catheter, after it has been pushed down to the seat of the stricture, will, if successfully managed, apply the escharotic substance to the surface of the morbidly contracted part of the canal. If there were no other method of treatment

equally efficient, it would be right to remedy, so far as possible, the defects that still remain in these apparatus, and acquire, by diligent practice, the art of employing them dexterously; but this will seem unnecessary when the method of treatment by Dilatation has been explained.

Division of the stricture by incision has been proposed and practiced at various times, both by cutting through the integuments, and by introducing a canula with inclosed lancet blade, which may be protruded after the sheath has been conveyed down to the stricture. Mr. Stafford has advocated this operation, and improved it by the invention of ingenious instruments for its performance; but the objections which have been alleged to the caustic apply still more strongly to such a mode of treatment, since it can never be safe, even in the hands of the most expert operator.

Dilatation has been long employed to remove strictures of the urethra, and even before it was known to be the cause of amendment. When fleshy excrescences were regarded as the source of obstruction, bougies, armed with caustic, or medicated, as it was termed, with various ingredients believed to have the power of promoting absorption, were introduced into the passage. The caustic, no doubt, produced its peculiar effects, but the other materials were found at length to be quite useless; and it became apparent that the good effects, which attended their employment, depended entirely upon the mechanical pressure of the instrument. Though the direct effect of a bougie is merely mechanical, the removal of the stricture depends on a vital process which is thus excited, and not on simple stretching. The pressure excites interstitial absorption of the thickened walls of the canal, and hence it is, that when an instrument of a certain size has been passed with difficulty, a larger one can often be readily introduced by a subsequent attempt a few days afterward. Such being the mode in which benefit is derived from the use of simple bougies in the treatment of stricture, it is evident that they must be employed so as to produce merely such a degree of irritation as is sufficient for giving rise to absorption, since more than this might be apt to occasion interstitial effusion instead of absorption, and aggravate the stricture instead of relieving it. The bougies, therefore, should not be introduced too frequently, or too forcibly, or for too long a time; and their use should not be persisted in when the parts or system are particularly irritable. Metallic bougies are best calculated for the purpose, being the most smooth and easily guided. They may be made solid of steel, and hollow of silver or of the compound metal named Berlin silver, which I have found to answer very well for the purpose, being sufficiently rigid, taking a fine polish, and not being liable to rust. They should be gently passed down to the obstructed part, in a series of

gradually decreasing sizes, until one can be introduced into the bladder, after which it ought to be immediately withdrawn. In the course of two or three days, when all the irritation that has thus been excited seems to have subsided, the same instrument may again be introduced, and after it is withdrawn, another of somewhat larger size. By proceeding in this way, the cure, in moderately favorable circumstances, may be completed within from three to six weeks. The grand error to be avoided, is that of proceeding too hastily, which not only defeats the practitioner in attaining the object he has in view, but exposes the patient to the danger of hemorrhage, complete retention of urine, swelled testicle, feverish attacks resembling ague, and other unpleasant consequences. The urethra should always be dilated to its full size, as a relapse is otherwise apt to happen; but any further extension than this can do no good.

The frequent occurrence in surgical practice of cases in which strictures of the urethra have existed during the greater part of a lifetime, notwithstanding assiduous efforts to remove them by practitioners of the greatest skill and experience, evidently shows that the means of treatment which have hitherto been employed, must be either uncertain in their operation, or only temporary in their beneficial effect. But when the suffering and danger, together with the mischief, both local and general, occasioned by the disease are considered, it must be admitted that such an imperfection in the art of surgery is a subject deserving the greatest attention.

The object of the following pages is to explain and recommend a method of treatment which has been found an effectual remedy for the disease, even in its most inveterate and obstinate form, and which, therefore, it is hoped, may supply this deficiency.

In estimating the value of such an addition to the resources of surgery, it would be necessary to take into account, not only the inadequacy of the established modes of management to afford in most cases more than palliation or temporary relief, but also the danger which attends their use of causing more serious evils than those they are intended to remove or alleviate. Before adverting more particularly to this part of the subject, however, it will be better in the first place to explain the steps which have led me to the conviction, that an expedient so simple as the one about to be described, is sufficient to accomplish quickly, safely, and surely, what has resisted all the prolonged, complicated, and hazardous procedures which ingenuity has devised, or patience endured.

The following case originally appeared in the "London and Edinburgh Journal of Medical Science," October 1844—and was reprinted in a collection of "Contributions to the Pathology and Practice of

Surgery," published in 1847, from which it is here quoted, together with the remarks prefixed.

Case I.—" Although the distinction between spasmodic and organic strictures, or, in other words, between the semblance and reality of contraction, has been long established in Surgical Pathology, the latter of these conditions was not supposed to vary except in degree and situation. The treatment, therefore, did not seem to require any diversity of procedure, and in this country most practitioners, preferring the plan of dilatation by bougies, employed it upon all occasions. But however efficiently strictures of the urethra might in general be thus treated, no surgeon could employ the practice to any considerable extent, without encountering embarrassing cases that presented more than usual difficulty, or even baffled every effort to accomplish recovery. I do not here allude so much to the mere tightness of contraction, and the difficulty consequently experienced in passing a small instrument through the stricture, as to the unyielding disposition manifested by the constricted canal, and its tendency to contract, perhaps even more closely than before, after being partially or completely dilated. One other feature of such obstinate cases of great importance to notice is, the strong and general sympathy of the system with every change taking place in the local disease; whence rigors and febrile attacks, leading to various derangements in different parts of the body more or less intimately connected with the part originally affected, are apt to result from attempts even of the most gentle kind to pass instruments into the bladder. Some constitutional disturbance, as that which occasions arthritic symptoms, would sometimes appear to be the cause of this particular state of stricture; and a local irritation, such as that of urinary concretions, is certainly adequate to produce the same effect, since all the features of excessive obstinacy and irritability are occasionally presented by stricture, in patients suffering from stone, and disappear at once so soon as it is removed. But independently of either the one or the other of these influences, the peculiar condition of stricture to which I wish to direct attention, may exist in its most perfect form, and is then found to constitute one of the most vexatious subjects of treatment, so long as it is combated by the means in ordinary use. The patient, in vain expectation of relief, is apt to require in succession the assistance of many different practitioners, each of whom, supposing that the previous want of success has depended upon deficiency of skill or care, proceeds to a repetition of the dilating process, destined to afford only a similar disappointment, or the more serious consequences already mentioned as not unusual under such circumstances. The following case presents a good illustration of this obstinate stricture. It led me to adopt the mode of

treatment which I am now desirous of recommending, and will probably prove more impressive if allowed to stand alone, than if associated with other instances of the operation. I have repeatedly performed it with perfect success, and never with any unpleasant consequences; so that instead of dreading, as formerly, to meet with the form of stricture in question, I now undertake its charge with the confidence of a satisfactory issue; and, while doing so, reflect with much regret upon the suffering that it would have been in my power to relieve, if this plan of treatment had occurred to me at an earlier period.

"About six years ago, I was requested by the late Dr. Hay to take charge of a gentleman who had suffered long and severely from stricture of the urethra. He was between forty and fifty years of age, of tall stature and robust form. His complaint had existed twenty years, and during the earlier part of this period had been partially alleviated by the introduction of bougies, but had then gradually increased, until at length the suffering occasioned by it was intolerable. During both day and night, the calls to make water were extremely frequent, and excited the most violent expulsive efforts, which, aided by a milking-like manipulation of the penis, and pressure along the perineum, never produced anything more than a scanty dribbling discharge. From the bladder being thus imperfectly emptied, the urine was constantly passing away insensibly, so as to keep the cloths wet, with what discomfort to the patient may be more easily imagined than described. He was peculiarly susceptible in regard to atmospheric changes, and especially in damp weather suffered an aggravation of the symptoms. The urine, when collected on some occasions, was found to deposit large quantities of glairy mucus, from which indeed it was never quite free.

"On examination, I found a tight stricture between five and six inches from the orifice of the urethra; and at the second or third attempt, succeeded in passing the smallest-sized bougie fairly through it into the bladder. I then supposed that, as usual, there would not be any further difficulty in treating the case, and desired the patient to call upon me twice a week, unless when the weather or any other circumstance should render a longer delay necessary. The progress, though not rapid, enabled me to pass No. 5 of my scale, equal to No. 1 of that in common use, when I found it impossible to make any advance. Indeed there was little encouragement to persevere in attempting this, as, notwithstanding the degree of dilatation that had been accomplished, there was not any appearance of relief from the symptoms of the disease.

"I then proposed to confine the patient to bed, and keep a succession of catheters, gradually increased in size, in the bladder. He made no objection, and was greatly pleased to find that, instead of the irritation he expected, there was at once obtained complete relief from all his

previous uneasy feelings. He read and wrote, ate and slept, without the least disturbance, drawing off the urine from time to time, and observing to his great satisfaction that the mucus had entirely disappeared. At the end of ten days I withdrew the full-sized silver catheter then employed, and before twenty-four hours had expired, found the complaint in every respect exactly as it had been before the process was commenced.

"Some months after this, I divided the stricture from within by means of a catheter containing a lancet blade, which was protruded from its sheath after the instrument had been passed through the seat of contraction, and kept in this expanded state while the catheter was withdrawn. A large bougie was immediately afterward passed with perfect ease; and again hope of success was entertained. But next day things were in precisely the same state as formerly.

"Several months having elapsed without any change, it was resolved to combine the two last-mentioned modes of treatment. In the first place, I divided the stricture as before, but on both sides, by means of two lancet catheters, cutting right and left, and then introduced a full-sized catheter into the bladder, where it was retained for a week. For some time afterward it seemed as if benefit had resulted from this procedure, and the patient, by frequently passing a bougie or catheter through the strictured part, was enabled to make water in a tolerably full stream. But this imperfect relief was of short duration, and by the end of two or three weeks, the frequent calls, laborious straining, and copious mucus, proclaimed that the stricture had regained its former condition.

"The patient now protesting that life was not desirable under the torment of his complaint, and entreating me to employ some efficient measure of remedy, no matter at what expense of pain or risk of danger, I resolved to divide the stricture by free external incision. With this view, a small staff, grooved on its convex side, having been introduced, I made an incision in the raphe of the perineum from the bulb to the anus, and then feeling for the stricture, which was easily recognized by its surrounding induration, ran the knife fairly through the whole extent of thickened texture. A full-sized catheter was substituted for the staff, and retained for a few days. The patient suffered little from the operation, except some uneasiness from irritation caused by the urine passing through the wound. When it closed, he felt quite well; and he continues to do so, though several years have now elapsed. He has never required the bougie, and in every respect enjoys the most perfect health.

"In this case, the obstinacy of resistance, and tendency to contract, occurred in an extreme degree. Indeed, the latter peculiarity was so strongly marked, that it suggested the idea of an adventitious elastic

texture, or rather one possessing contractile properties similar to those of the middle coat of the arteries. It is plain that the most prolonged use of bougies would not have effected a cure. And the result of retaining catheters in the urethra, shows that this mode of treatment is not so effectual as it has been represented, since it only produced a temporary dilatation. But the most important lesson is to be drawn from the results of the different trials that were made of internal incision by lancet catheters. Additional space was thus at once obtained, and the passing of bougies was greatly facilitated, without any lasting difference being effected in the contractile power of the stricture. It hence appears that this mode of treatment affords no practical advantage, since, in the ordinary condition of stricture, bougies accomplish recovery on the easiest possible terms; and in its obstinate form, an internal incision does not prove sufficient to relieve the patient. The reason of this I believe to be, that the obstinate stricture in question requires, for its complete and permanent remedy, a thorough division of the firm texture which surrounds the contracted part of the canal."

The only objection to which the evidence afforded by this case seems exposed, is the want of corroborative testimony from similar results having been experienced by other patients, since a single fact of the kind may be attributed to some peculiarity of the individual or part affected; but the following additional instances of a successful issue, under circumstances of the same kind, will, it is hoped, remove any doubt that may remain in regard to the efficiency of the treatment I have ventured to propose.

Case II.—About the middle of last February, Mr. Hamilton Bell asked me to see an officer of the East India Company's service, who had been obliged to return home between two and three years before that time, on account of illness from stricture and ague. The former complaint had existed during six of the seven years which he had spent abroad, and had latterly become so severe as to interfere seriously with his health. Micturition was extremely laborious and painful, while the calls to it were so frequent, that they prevented rest at night, and destroyed all comfort during the day. But what he suffered from most, was an extreme liability to feverish attacks, of intense severity, though short duration, and succeeded by a degree of lassitude denoting great exhaustion. Notwithstanding every precaution, they occurred so frequently, that he was hardly ever free from the paroxysm or its effects; and, in consequence of this long-continued drain upon his strength, had been reduced to a state of excessive emaciation and weakness, with complete prostration of mental energy, not less than bodily power. Eighteen months of careful treatment by bougies having failed to afford the slightest relief, he had at length come to

regard retirement from service as his only alternative; and the motive of his requesting me to visit him, was not so much any expectation of relief as the desire to get his mind settled with regard to a step of so much importance, not only to himself, but to a wife and children dependent upon him for their support.

In proceeding to examine the urethra, I found the patient so morbidly sensitive, that the slightest touch of the bougie produced the most violent convulsive movements, and I was, therefore, obliged to place him under the influence of chloroform before the requisite information as to the state of the canal could be obtained. I then readily passed a small grooved director, equal in size to No 1 of the bougie scale, through the stricture, which was at the bulb; and, having ascertained that there was no other obstacle to recovery, expressed my persuasion that division of the contracted part of the urethra would quickly restore the patient to health. On the 2d of March, chloroform having been again administered, I performed the operation without the slightest delay or difficulty. The catheter was removed at the end of forty-eight hours, and by the end of ten days, the urine, which had been gradually resuming its proper course, ceased entirely to be discharged through the wound. The patient then got out of bed, and rapidly regained his strength, so that, by the end of another week, he was able to go into the country, where he has since remained in the full enjoyment, and with all the appearance, of robust health. The operation not only removed all trace of the stricture, but completely relieved him from his morbid sensibility, so that a full-sized bougie may be passed without the slightest uneasiness; and also from the feverish attacks—not one of which has occurred since he was under my care. He is now preparing to rejoin his regiment in India.

Case III.—D. I., aged thirty, a confectioner, was admitted into the the Royal Infirmary on the 17th of December, suffering from the symptoms of stricture in a very aggravated form. He had had retention of urine for twenty-four hours, and stated that he was liable to such attacks, in the intervals of which, to use his own words, "he could neither make nor keep his water," being unable to void it voluntarily in a stream, or prevent its constant exudation by drops, with the effect of wetting and rotting his clothes, irritating the skin, and causing ulceration of the prepuce and thighs. His condition was indeed wretched in the extreme, and had existed, with progressive aggravation, for five years. The stricture would not permit the smallest catheter to pass, but was so far relaxed by the attempt to effect this, followed by the warm-bath, as to permit the urine to escape by drops, and thus afford temporary relief.

On examination, I found that there were two strictures, one being at the neck of the glans, and the other about four inches and a half from the orifice. It was the latter which, from its extreme tightness and excessive irritability, appeared to be the chief seat of the patient's complaint. The smallest bougie, and even a probe, could not be passed through it; but, after several trials, a very slender knitting needle was introduced, and followed by others of somewhat larger size. No relief being thus obtained, and several weeks having been spent in the hospital, without the slightest benefit, it seemed necessary to adopt a more efficient course.

On the 20th of January, a small grooved director, not exceeding in size the largest knitting needle permitted to pass, having been introduced, and the patient being placed in the position for lithotomy, an incision was made in the middle line of the perineum, so as to let the conductor be felt, and allow the knife to be inserted into its groove. The stricture was then divided, and a moderate-sized catheter secured in the urethra to prevent any risk of extravasation.

The patient seemed to experience relief from the instant the stricture was divided, and suffered no inconvenience from the catheter, which was withdrawn at the end of forty-eight hours. He made all his water through the wound for three or four days, and then found it gradually resume the natural passage. On the twelfth day after the operation, he ceased to discharge any urine by the wound. He could retain it for five hours at a time, and passed it in a full stream. He also bore the introduction of an ordinary-sized catheter without uneasiness. On the 2d of February, he was dismissed, in all respects perfectly well.

Case IV.—J. T., aged thirty-six, was admitted into the Royal Infirmary on the 29th of November, suffering very severely from stricture of the urethra. He stated that, about three years before, he had lain intoxicated in the street during the whole of a winter night — in the morning finding himself, to use his own expression, "frozen to the ground;" and immediately afterward had begun to suffer from the symptoms of stricture. In the course of the preceding winter he had been eleven weeks in the hospital under treatment by dilatation, with considerable but only temporary relief, as the symptoms returned very soon after his dismissal.

In these circumstances, it appeared necessary to divide the stricture, which was extremely tight and seated at the bulb. I performed the operation on the 2d of December. The catheter was removed on the 4th, and the patient was dismissed, with complete relief from his complaint, on the 3d of January.

Case V.—The following statement, by a surgeon in London, who had charge of the patient to which it refers before he came under my care, will give a better idea of the severity and obstinacy that characterized the symptoms than any description not founded upon observation:

"London, April 16, 1849.—I first attended Mr. —— about seven years since. At that time he was laboring under an impermeable stricture which had resisted for a considerable period all attempts to pass instruments beyond it, although made by several hospital surgeons of eminence. One surgeon had used considerable violence, which, beside producing great constitutional disturbance, accompanied by a painful swelling of the perineum, was the cause of an extensive chronic induration of that part. His general health was bad, and the slightest exposure to cold produced severe rigor. Under the treatment I adopted, the stricture was so far removed as to admit full-sized instruments, and the patient returned to the country able to pass them himself. However, after a time increased difficulty in passing the instruments arose, and the patient gradually diminished their size. At length none but the smallest size could be passed, and the patient came up to me. I need not detail the treatment adopted during the six weeks or two months he remained in London, as no material or permanent benefit resulted from it. The summer before last, he was again very much troubled by continued and excessive soreness at the seat of stricture, spasms, rigors, and occasional attacks of retention of urine. The urine was unhealthy, and deposited a copious mucous sediment, and the general health bad. By my direction, he remained in bed (in the country), with a catheter kept constantly in, and gradually increased until the largest size could be passed with ease. Under this treatment the urine became healthy, and the general health improved. But almost within forty-eight hours after the withdrawal of the largest instrument, No. 2 could hardly be passed. Since then, until about two months ago, the patient contented himself with occasionally passing a catheter at intervals of a few days or weeks, according to circumstances, and retaining the instrument for twenty-four hours, when he withdrew it, and introduced a larger one, which he kept in for twenty-four hours more. About five months ago catarrh of the bladder, irritative fever, soreness, and spasms, returned and became constant, with frequent rigors and retention of the urine. Two months ago, he again came under my care. By remaining in bed, with catheters retained, and medical treatment, the urine became healthy, and the more urgent symptoms, both local and general, were relieved. But the stricture still did not admit a larger instrument than when he came to town. Being fully assured that *no* treatment with urethral instruments would or could be of any service in this case, and

having accidentally read the case reported in your work, entitled 'Pathology and Practice of Surgery,' I mentioned the operation to the patient, telling him of the success you had met with. At the same time, being unwilling to take the whole responsibility of recommending the performance of an operation of which I had no personal or practical knowledge, I proposed a consultation with Sir B. Brodie, who accordingly saw the patient with me, and agreed that some such operation afforded the only prospect of anything like permanent relief to him.

"P. S.—I should add that Mr. ——, is not a strong man, but, on the contrary, weak, nervous, and irritable, dreadfully alarmed at the prospect of an operation, and sure to suffer rigors from any irritation."

This not very promising patient arrived in Edinburgh on the 6th of June, when, in addition to the particulars above-stated, I learned that he had been an officer in the service of the East India Company, and retired from it in 1826; since which time he had suffered from the disease. On his way here he had been attacked by a fit of retention at Carlisle, and detained there until he obtained relief by passing an elastic catheter of the smallest size, but which was, nevertheless, so tightly grasped by the stricture that serious apprehensions were entertained of its being broken in the withdrawal. Painful spasms and copious mucous deposit, consequent upon this attack, prevented me from making any examination for several days, and the patient had recourse to his usual expedient for obtaining relief by lying in bed with a small catheter retained. At length, the urine becoming clear and the spasms subsiding, I ascertained that a small grooved director could be passed through the stricture, which was at the bulb; and being unable to detect any other obstacle to recovery, I did not hesitate to undertake the operation.

On the 13th, the patient being in a calm deep sleep, induced by the agency of chloroform, I divided the stricture, and introduced a moderate-sized silver catheter into the bladder, without any delay, so that the operation was completed in less than a minute. About half an hour afterward, the patient awoke, and found himself lying comfortably without pain or uneasiness. The catheter was removed at the end of forty-eight hours, when, to his great delight and astonishment, the water flowed through the urethra in a full stream, the sound of which was said by him to be more pleasing than the finest music. None of the urine escaped by the wound, and no other inconvenience resulted from the operation. On the 13th of July, the patient returned home, where his progress in the recovery of general health will appear from the following extract of a letter, dated the 1st of August:—"I cannot adduce stronger evidence than by stating that a

few days since, Dr. ——, the medical referee of a life assurance office, voluntarily remarked that he should not have the slightest hesitation in recommending my life for assurance, although in May last he did not consider it worth a year's purchase."

Case VI.—A private soldier in one of the Queen's regiments serving in Ireland, thirty-three years of age, applied to me last winter, on account of a stricture at the bulb of the urethra, from which he had suffered nine years, and latterly so much as to render the discharge of his duty very oppressive. The military surgeons to whom his case had been submitted, being unable to pass instruments through the contracted part of the canal, had proposed his retirement from the army; but to this he felt averse, as a short additional period of service would entitle him to a pension, and he had therefore obtained leave of absence, in the hope that I might enable him to make out his time.

At the first attempt, a bougie of the smallest size was passed into the bladder, and successive steps of improvement were afterward obtained in respect to dilatation, but without any corresponding change for the better in regard to micturition, which continued no less frequent and painful than before. Thinking that this unsatisfactory progress might proceed from exposure to the cold wet weather which then prevailed, I advised the patient to go into the hospital, which he accordingly did on the 22d of January.

The treatment by dilatation was then pursued, with all possible care and attention; but still failing to afford relief, and the patient's leave of absence being nearly exhausted, I proposed to divide the stricture, and meeting with no objection, performed the operation on the 8th of February, with perfect facility. The catheter was removed at the end of forty-eight hours. The urine passed partly by both orifices for a week, then gradually diminished to a few drops by the wound, and, in the course of a few days, entirely resumed the natural channel, the patient feeling completely relieved from all his former uneasiness, and having a full-sized bougie passed occasionally without the slightest obstruction. He was dismissed on the 14th of March, in all respects ready to resume his place in the ranks.

Case VII.—A sergeant in one of the queen's regiments serving in Scinde, twenty-six years of age, who had returned home with a detachment, was recommended to my care on account of a stricture of the urethra at the bulb, under which he had labored for three years. Finding that the contraction was very tight, and learning that the patient was desirous of repairing to his depôt without delay, I proposed division of the stricture, and performed it on the 4th of April; the catheter was removed on the 6th, and by the end of the

week, the whole of the urine passed by the urethra. A full-sized bougie was passed twice or thrice afterward, with the interval of a few days, and the patient then proceeded to his duty at a military station in England, where, I am informed, he has continued perfectly well.

Case VIII.—The following case may be related in the words of the patient, extracted from a letter containing many grateful expressions, which he addressed to me soon after his recovery :—"I very early in life found that I had stricture, and, in the year 1816, placed myself under the care of Mr. Liston, who employed bougies up to a large size, and I may say then cured me. In a few years, however, the stricture returned, and I then applied to Sir William Newbigging, who afforded me great relief by bougies, and instructed me to use them myself. I continued to do so for many years, at the same time reading all works on stricture that fell in my way, and consulting many medical men; but all the consolation I met with was, 'you must go on with the bougie.' I cannot describe all that I have suffered from the stricture. From time to time I have had retention of urine, causing such laborious straining as I have often feared would induce apoplexy, having a tendency of blood to the head. I have had to carry my bougie into public places and private companies. At other times, the water has passed so suddenly and unexpectedly, as to occasion me no less annoyance. I have been very sensible of atmospheric changes, especially in the spring time, and during the prevalence of east wind, which always caused an aggravation of the symptoms. I have also frequently suffered from lassitude, weakness of the joints, and pains through my body, all of which, being now greatly relieved, I must suppose proceeded from the stricture.

"I had suffered greatly, and was in the daily use of my bougies—indeed could not make my water without them—when I went to you. You at first relieved me by passing instruments, and did not think badly of my case; but, after a time, finding that there was no improvement, recommended an operation as the only effectual remedy. I submitted to it, and now consider myself perfectly cured. After having the stricture upward of thirty years, having often thought and laid my account that it would ultimately kill me, I now believe, as you said, that whatever I die from, it will not be *stricture*. No one need fear the operation; I have suffered more from the passing of a bougie. Within eight days after the operation, I was out taking short walks, and a few days thereafter in Edinburgh, quite well again."

This patient is a retired member of the legal profession, residing at the distance of a few miles from town. The operation was performed

on the 11th of July. A little urine passed by the wound during the evening of the day on which the catheter was removed, but none afterward.

Case IX.—During my residence in London, an officer of the navy applied to me on account of a stricture of the urethra, so obstinate as to have been deemed irremediable. It had existed since his midshipman days, and progressively become more troublesome, notwithstanding many long courses of treatment by various surgeons at home and abroad. The local symptoms were extremely severe in respect to the frequency and difficulty of micturition, which was accomplished by drops or the smallest of streams; and the constitutional disturbance also was excessive, through frequent attacks of the most violent fever. The patient had been early and honorably promoted to the rank of commander, and repeatedly offered employment which he felt it necessary to decline from the state of his health.

On examination, I found a very tight stricture at the bulb, through which a small catheter was with some difficulty introduced into the bladder. Several instruments of larger size were afterward passed at intervals of a few days, but without producing the slightest benefit, in regard to the frequency of his calls to make water, or the size of stream in which it was discharged. I then tried the retention of a catheter in the bladder, which proved quite intolerable beyond a few hours; and being thus fully satisfied that dilatation in any form would be inadequate to afford relief, proposed division of the stricture by external incision.

The patient followed me to Edinburgh for this purpose, and had the operation performed, with the immediate effect of affording complete relief. He was not only at once freed from any trace of local uneasiness, but ceased to suffer from the feverish attacks, and quickly regained the aspect, together with the feeling, of perfect health.

Case X.—A gentleman, twenty-six years of age, from the north of Scotland, applied to me in the early part of last spring for relief from an imperfection of his urinary organs, which occasioned him the greatest annoyance. It appeared that, when about eight years old, he had been operated upon for congenital phymosis, and that the prepuce had then been found adherent to the glans, so that only a very small part of its apex could be uncovered. Continuing to suffer from pain and extreme difficulty in making water, with such contraction of the orifice of the urethra as precluded the introduction of the smallest instrument, he had undergone more lately a second operation, with the view of restoring the canal, or rather establishing a new one, in place of the natural channel which appeared to be obliterated. For

this purpose a narrow sharp-pointed knife was thrust between one and two inches along its course, backward from the seat of the external orifice, so as to admit the entrance of a small bougie to this extent. All attempts to pass instruments of any texture or size beyond the *cul-de-sac* thus formed had proved ineffectual. The patient experienced the greatest difficulty in voiding his urine, and being able to accomplish this only by drops, required so much time for the purpose, that he felt ashamed to seek relief except when secluded from observation or remark. From the inconvenience thus sustained, operating upon a sensitive disposition, so much distress and despondency resulted, as nearly to unfit him for the active business of life.

Having administered chloroform to prevent the excessive irritability of the patient from interfering with the process of examination, I succeeded with some difficulty in guiding the small gold probe used for insertion into the *puncta lacrymalia*, through the contracted part of the canal, which extended from the bottom of the *cul-de-sac* above mentioned. The probe, when grasped by the stricture, could be felt distinctly surrounded by a ring of condensed texture; and regarding this as the source of annoyance, I proposed to divide it by external incision. Having obtained the patient's consent to this proceeding, I prepared for it by passing a succession of small wires, gradually increased in size until one adequate to carry a groove could be introduced. I then divided the stricture, and introduced a silver catheter into the bladder, to ascertain that there was no further obstruction, but did not allow it to remain, as the vicinity of the wound to the orifice of the urethra seemed to prevent any risk of extravasation—the patient at once obtained relief, and enjoys the comfort of making water like his neighbors, so much that he declares life seems to him a new sort of existence. He was also completely freed from the peculiar sensibility which had so much impeded his treatment, and indeed rendered the administration of chloroform an essential prelude to each step for exploration and operation. From the day on which the stricture was divided, he never made the slightest objection to the passing of instruments, and can now introduce them himself without difficulty or inconvenience.

In connection with this case it may be remarked, that congenital adhesion of the prepuce to the glans, may always be remedied if noticed during infancy or early childhood, by using a sufficient degree of force to effect separation of the respective surfaces. If interference be delayed until the later period, it is sometimes necessary to break through the anterior edge of the union by means of a probe, or cut it with the point of a knife, after which separation may be readily effected. Where there is the farther complication of phymosis, it must of course

be remedied in the first instance, to afford the freedom of access requisite for exposing the glans.

Case XI.—A. S., aged twenty-eight, a bookbinder, was admitted into the Royal Infirmary on the 29th of July last, for stricture of the urethra at the bulb, complicated by a false passage, as stated in the recommendation of a medical man which he brought with him. The camplaint was attributed to a gonorrhea contracted ten years ago, and had been very troublesome for the last five years, impeding micturition so much that the urine frequently could not be voided except by drops and occasionally causing complete retention. It was through ineffectual attempts to afford relief during these attacks, by introducing instruments, that the false passage had been established.

Having allowed the patient to remain quiet for a few days, I succeeded, on the 7th of August, in passing a bougie through the stricture; and thinking it likely that the treatment by dilatation would prove unsatisfactory, performed division, on the 11th. The urine escaped partially by the wound for a few days, and the patient, who had been quite well for a fortnight, was dismissed on the 2d of September, without any trace of the disease or its remedy.

Of all the cases in which I have divided the stricture, only one has been followed by any unpleasant result. On that occasion, the patient suffered from a formidable attack of erysipelas, which, commencing in the perineum, gradually extended over the whole surface of the body, accompanied by constitutional disturbance so violent, as to prove all but fatal and productive of emaciation, with prostration of strength, to an extreme degree. During this illness, the wound, instead of healing as usual, remained open for several weeks—just as when first inflicted; and it retained its conical form after the process of granulating contraction began, so that when cicatrization was at length completed, the urethra had a very thin covering at the seat of the aperture, which therefore was apt to open from time to time, and discharge a little urine. It may be added that the combination of circumstances which gave rise to this untoward occurrence, was so complicated and unusual that it can hardly by any possibility ever happen again.

I could add more cases, and would do so, unless those already related appeared sufficient to satisfy any unprejudiced mind, while no amount of evidence could alter the sentiments of those determined to go on in the old way. But it may now be proper, although at the expense of some repitition, to give a connected account of the operation, and its after-treatment.

If the patient has a great dread of pain, and wishes to escape from the slight degree of it which attends the requisite incision, he should be placed under the influence of chloroform—not partially, so as

merely to suspend his consciousness, or impede his recollection of suffering, but completely, so as to prevent any restlessness or unruly struggle, which would tend very seriously to increase the difficulty of the procedure. He should then be brought to the edge of his bed, and have his limbs supported by two assistants, one of them standing on each side. A grooved director, slightly curved, and small enough to pass readily through the stricture, is next introduced, and confided to one of the assistants. The surgeon, sitting or kneeling on one knee, now makes an incision in the middle line of the perineum, or penis, wherever the stricture is seated. It should be about an inch or inch and a half in length, and extend through the integuments together with the subjacent textures exterior to the urethra. The operator then taking the handle of the director in his left, and the knife, which should be a small straight bistoury, in his right hand, feels, with his fore-finger guarding the blade, for the director, and pushes the point into the groove behind, or on the bladder side of the stricture—runs the knife forward so as to divide the whole of the thickened texture at the contracted part of the canal, and withdraws the director. Finally, a No. 7 or 8 silver catheter is introduced into the bladder, and retained by a suitable arrangement of tapes, with a plug to prevent trouble from the discharge of urine.

The process having been thus completed—which it may be in less time than is required for reading its description—the patient has merely to remain quietly in bed for forty-eight hours, when the catheter should be withdrawn, and all restraint removed. The urine sometimes maintains its proper course from the first, but more frequently passes in part through the wound for some hours, or it may be a few days. No attention or interference is required on this account, but at the end of eight or ten days a moderate-sized bougie should be passed, and repeated once a week or fortnight for two months. In most cases, the cure may then be deemed complete and lasting. But if the tendency to contraction should have been extreme, or if the patient's way of life should be such as to favor the reproduction of stricture, it will be a prudent precaution to have the bougie passed four or five times in the course of a year, in order to avoid all risk of future trouble.

Such being the mode of treatment which I wish to recommend, it may next be inquired, how far the other methods in use, for the remedy of stricture, are adequate to overcome the difficulties presented in practice.

The means at present employed for this purpose are: 1. Dilatation by bougies; 2. Dilatation by catheters retained in the bladder; 3. The escharotic effect of caustic; 4. Internal incision by sheathed blades passed through the stricture; and 5. Incision of the perineum in search

of the urethra deemed impermeable. Of these, the one first-mentioned is justly regarded as the safest and best.

Bougies were originally employed to convey remedial applications considered suitable for the removal of warty growths from the urethra, erroneously supposed to be the cause of contraction in the canal. Afterward, when more correct information was obtained in regard to the true nature of the disease, the good effect of their introduction was ascribed to the mere force of mechanical dilatation. So late as thirty years ago, Dr. James Arnott invented his ingenious apparatus for dilating the contracted urethra by the force of fluid urged in by a syringe, and pressing upon the flexible sides of a membranous tube introduced through the canal; and about the same time, I recollect of seeing tried, on one occasion, a steel bougie divided longitudinally into two portions, which admitted of separation from each other by a sliding movement at the handle, so as to rend asunder the edges of the stricture.

It is now universally admitted that the bougie acts beneficially by exciting a degree of irritation sufficient to induce absorption of the thickened texture which occasions the contraction and induration concerned in the formation of stricture. To produce this effect, the instrument should be employed with the utmost possible gentleness—should not be allowed to remain in the urethra more than one or two seconds—and should not be introduced again until the expiration of from two to four days, or rather until any uneasiness excited by it has completely subsided. The best instruments for the purpose are made hollow, of Berlin silver, which possesses the requisite degree of rigidity, takes a fine polish, and is not liable to rust. They were first made here at my desire many years ago, and have been extensively used, with great satisfaction to all who have employed them, being much preferable, on account of their lightness, to the heavy plated steel bougies. The flexible or elastic gum instruments are safer in unskillful hands than those of the rigid kind, but can never be introduced with the same delicacy, or guided with so much precision, as the latter, which should, therefore, be preferred by all practitioners who are able to use them.

When the existence of a stricture is suspected, the urethra should be examined by introducing a moderate-sized bougie, such as No. 8. If one larger than this be employed, it may encounter resistance at the narrowest part of the channel, though there is no real contraction, while one of smaller size may not detect a degree of stricture requiring dilatation. But when a bougie of the size above-mentioned is obstructed, there need be no doubt as to the existence of stricture, and its degree of tightness should next be ascertained by trying a succession of smaller instruments until one is passed. It is unnecessary to

say anything as to the preposterous plan of taking casts of the stricture by pressing upon it the extremity of a soft plaster bougie, since any one at all conversant with the subject must be satisfied that such a procedure can produce no result better than deception either of the practitioner or the patient. The only satisfactory measure of a stricture is the instrument which it allows to pass; and this being ascertained, the dilatation may proceed from that point, according to the principle which has been explained. But however often the introduction of instruments may be required for this purpose, the greatest care should be taken to avoid all attempts to gain an advance by force in opposition to unfavorable circumstances. If the patient is heated or out of order—if he has exceeded in the use of stimulants, or purposes to do so—if he has performed a journey or is about to undertake one—if the urine is thick or loaded with mucus—if the bowels are constipated or unduly relaxed—if the urethra is inclined to bleed or appears more than usually irritable—if there is pain of the testicles or perineum—and, finally, if the surgeon is in haste or out of humor, the operation ought to be delayed.

When carefully conducted, with due attention to all the precautions which have been mentioned, the process of dilatation frequently affords the most satisfactory results; but, except in cases which yield readily, it is exposed to the following serious objections. In the first place, it is attended with the risk of many untoward occurrences which not only impede recovery but complicate the patient's sufferings, and even endanger his life; secondly, it cannot be depended upon as a source of lasting relief; and, thirdly, it is altogether inadequate to remedy that obstinate form of the disease in which the stricture has a resilient disposition to contract, accompanied with a great degree of irritability.

All persons laboring under stricture are more or less liable to attacks of fever resembling ague, which, though frequently appearing to occur spontaneously, are very much under the influence of external circumstances, especially such as relate to the urinary organs. Of these, the introduction of a bougie is one of the most certain in producing the effect; and although in general the rigor so induced is soon succeeded by the hot and sweating stages, which pass away without any trace beyond a degree of exhaustion proportioned to their severity and duration, yet, if the patient should happen to be in an excitable state, or suffer from any other source of disturbance, such as exposure to cold, the paroxysm may lead to consequences of a much more serious nature. Herpetic eruptions on the lips and face, painful swelling of the testicles, and abscess of the perineum, are the most common of the local derangements that result from the constitutional disturbance so induced, which may, however, be so violent as to prove

fatal, either directly in the first instance, or more slowly by giving rise to suppuration in the large joints.

In illustration of what has just been stated, the following cases may be mentioned:—A gentleman under treatment of stricture, had the bougie passed on a cold winter day. He was advised to go straight home, but happening in his way to meet a lady to whom he was under engagement of marriage, accompanied her to church. In the evening he had a rigor, and next day a swelling of the perineum. In another instance, a gentleman, after having a bougie passed for stricture, walked home the distance of two or three miles during a fall of snow. He had an attack of fever, terminating in diffused deep-seated inflammation of the leg, with sloughing of the fibrous textures, and when apparently recovering from this, began to suffer from suppuration of that hip-joint, which proved fatal. A third patient, under treatment for stricture of old standing, went to the country in cold winter weather. He had an attack of fever, followed by local derangement, for which I was asked to see him at the end of three weeks. He then appeared to be at the point of death, there being a large abscess of the perineum, with extravasation of urine, and all the signs of approaching dissolution. A free incision, and an abundant supply of wine, enabled him to rally from this alarming state, but suppuration of the ankle-joint succeeded; and when the discharge from this source had nearly ceased, a formation of matter taking place in the hip-joint put an end to his sufferings. The fatal result ensued more quickly on another occasion, when a late distinguished surgeon passed a bougie through the stricture of an irritable patient, or attempt to do so: violent fever followed, and terminated in death at the end of forty-eight hours.

While the bad effects of the bougie may often be ascribed to imprudence on the part of the patient, it must be admitted that want of skill or care on the part of the surgeon, is a much more fruitful source of evil. Whenever bleeding attends the operation, it is certain that the lining membrane of the urethra must have been grazed or lacerated, and not improbable that a false passage has been formed through the membrane. But the mischief thus inflicted must increase the risk of bad effects at the time, and also render the future progress of the case more embarrassing. Indeed, when false passages are fairly established, it is impossible, through any degree of caution or experience, to avoid them with certainty. Such being the dangers which attend the use of bougies, the risk of the whole process of dilatation may be estimated from the number of instruments, and the frequency of their introduction, required to complete it.

The second objection which may be alleged against the treatment by bougies is, that the relief afforded by it seldom proves permanent.

Sir B. Brodie says:* "In a few cases of incipient stricture, and in some of those in which a stricture is merely spasmodic, after a bougie has been used for a certain length of time, the use of it may be dispensed with, and there will be no recurrence of the disease. But these cases are rare exceptions to the general rule, which is that there is danger of a relapse, and that a patient, who is desirous of continuing well, must submit to the occasional use of the bougie ever afterward." My own experience would not lead to a statement quite so discouraging; and the difference may perhaps be attributed to the dilatation practiced in Edinburgh being more ample than that which appears to be thought sufficient in London, if it be fair to judge from the size of bougies committed to patients for their use after recovery. It is believed here, that unless the urethra be fully dilated to its natural capacity at the seat of contraction, the stricture is sure to return very speedily, and to this extent the process accordingly is always carried. But although the risk of relapse may thus be lessened, it certainly cannot be altogether prevented; and the disease too frequently maintains its hold during the remainder of the patient's life — becoming more troublesome, and less manageable, as age advances, so as at length to destroy all comfort by day or night — exhaust the patient's strength—and finally put a period to his existence, after a long struggle between contraction and dilatation.

The third objection to this mode of treatment which I have mentioned is, that the disease occasionally does not admit of any beneficial effect from its employment. In these cases the stricture has such an elastic or resilient disposition to contract, as to prevent any advantage being derived from the introduction of bougies, while its irritability is so extreme, as to render the most gentle use of instruments sufficient to produce the most violent rigors, with their consequences in a proportional degree of severity, so that the surgeon must either abandon the attempt to effect dilatation, or persevere in his efforts, to the destruction of the patient. This obstinate condition is sometimes original, existing from the commencement of the disease, but more frequently is developed in its progress, becoming more and more manifest as years advance, and ultimately causing more deaths than is suspected by the public, or is even generally known to the profession.

It is in such obstinate cases that the treatment by retention of catheters in the bladder, with progressive increase of their size, has been thought proper. But even when the patient can bear this continued pressure of the instrument, which is not by any means always the case, little advantage is gained; since the stricture seems to contract with a degree of rapidity proportioned to that of its dilatation, and to

* On the Urinary Organs; 1849; p. 71.

have its resilient disposition rather increased than lessened by the forced expansion to which it has been subjected. The catheter, therefore, is no sooner withdrawn than the symptoms of contraction return, and often prove more troublesome than they were previous to its introduction.

With regard to the use of caustic for the cure of stricture, it must be obvious that all which has been said as to the injurious effects and dangerous consequences of introducing the most simple dilating instruments into the urethra, will apply with tenfold force to the employment of bougies "armed" with escharotic substances, or any other apparatus constructed for the conveyance of such irritating agents. But independently of this objection, I do not hesitate to express my persuasion, that a real organic stricture cannot be removed by caustic; since, even admitting that the agent could be accurately applied, the destructive effect of the nitrate of silver is so limited, as to be quite inadequate for the purpose, while that of potass is so diffused, that in the event of destroying the stricture, it must cause a worse one through the unavoidable loss of substance attending its operation, and the consequent contraction in healing. On the whole, it seems more reasonable to conclude, that in the cases of alleged cure by caustic, there was no real stricture in existence, than to suppose that so improbable, or rather impossible, an achievement had been accomplished.

The symptoms of stricture are simulated by those proceeding from many other derangements of the urinary organs, and are still more frequently the offspring of imagination when the mind is weak or morbidly sensitive of local impressions. This condition may arise at any time of life, but is most common at the age which succeeds a youth of freedom or excess. Many of the uncomfortable sensations then experienced are apt to be referred to the urethra or the neighboring organs; and if the patient is sufficiently unfortunate to place himself under the charge of an ignorant or unprincipled practitioner, consequences no less serious to his health than to his purse may ensue. It is then that disease of the prostate, remediable by the introduction of bougies smeared with belladonna, are detected, and afford a pretext for treatment prolonged during months or years. And it is then, too, that chiefly abound strictures "at the neck of the bladder," "spasmodic strictures," and strictures curable by caustic. Sir B. Brodie, who from his early connection with Sir Everard Home, the great advocate of caustic, must be supposed well acquainted with the effects of this treatment, and cannot be regarded as a hostile witness against it, distinctly limits the field of its beneficial application to the relief of spasm, and admits the danger attending it, though employed merely for this purpose; while, for the confirmed organic stricture, which con-

stitutes the subject of the present inquiry, he declares that "the caustic is absolutely inadequate to the cure."

The next method to be considered, is internal incision of the stricture by means of a sheated blade introduced through the narrow part of the passage, and protruded in the act of withdrawal. Less mischief than might be expected from this proceeding is said to have been experienced from its employment. But, while unnecessary and useless in those cases which admit of dilatation by the bougie, such an operation is not sufficient for counteracting the contractile tendency when it exists in a more energetic form. (See Case I.) During my residence in London, Dr. Scott, examining physician of the East India Company, asked my opinion as to the case of an officer on sick leave. His complaint was a stricture at the bulb, so tight, that it was with some difficulty I succeeded in passing an instrument of the smallest size through it, and attended with symptoms denoting an extreme degree of irritation. The patient stated that he had suffered from the disease before going abroad, and had been under the care of a surgeon in London, who treated him by internal incision, with the assurance that he was permanently relieved from all future trouble; but that, nevertheless, having set out for India immediately afterward, he had not completed half the distance to his destination, before the symptoms returned with redoubled severity. In these circumstances, the case seemed a proper subject for external incision; and if this had been done, I entertain no doubt that the patient would have regained his health in the course of a few days. He proposed to place himself under my care for this purpose, but from leaving London soon afterward, I saw no more of him, and have since heard that he resigned his commission, in despair of being ever able to serve with comfort.

The last, and certainly most objectionable of all the methods which have been mentioned above as in use for the treatment of stricture, is cutting into the perineum in search of the obstructed canal, without any further guide than the point of a catheter, introduced not through, but merely down to, the contracted part. Sir B. Brodie says, very truly, "even under the most favorable circumstances, it cannot be otherwise than doubtful, whether the stricture be properly divided, that is, whether the incision has passed through the narrow canal in the center, or through the solid substances on each side. I suppose that no surgeon would recommend such an operation, except as a last resort, when no instrument could be made to pass through the stricture by other means." It might be added, that in addition to the danger thus incurred, of establishing an imperfect canal, constantly disposed to contract, and inconvenient from its tortuous direction, there is also the immediate hazard of failure in accomplishing the introduction

of a catheter into the bladder, which would expose the patient to nearly certain death from extravasation of urine.

No two operations can be more different in the principles upon which they are founded, the security of their execution, and the result of their performance, than the one thus so justly reprobated, and that which, in the preceding pages, it has been my endeavor to recommend. The ground of the former is belief in the impermeability of the stricture, while the latter essentially requires the passage of an instrument through it. The former is protracted, uncertain, dangerous, and unsatisfactory; while the latter is done at once, perfectly safe, and completely effectual. It must have been from confounding two procedures so entirely different, or more probably from acquaintance with only one of them, that an hospital surgeon in London, when consulted as to the expediency of submitting to my treatment, coupled his sanction with the advice, that the patient should in the first place make his will.

The operation by external incision hitherto employed, has been resorted to as the refuge of awkwardness or failure in the introduction of instruments, there being no truly *impermeable* stricture, while the one now advocated can be accomplished only by steps requiring the nicest manipulation. Passing rigid instruments through a tight stricture, was said by Mr. Liston to be "the most difficult in the whole range of surgical operations;" cutting into the groove even of a large staff, is considered by many the most embarrassing part of lithotomy; and conveying a catheter into the bladder through a urethra having a slit in its side, would perplex an operator not well acquainted with the course of the canal. Such being the nature of the operation, it should hardly be undertaken by any one who is not able to overcome the ordinary difficulties which are presented in the surgical treatment of the urethra.

From what has been said in the foregoing pages, I trust it will appear established:

1. That division of a stricture by external incision, is sufficient for the complete remedy of the disease in its most inveterate and obstinate form.

2. That in cases of less obstinacy, but still requiring the frequent use of bougies, division is preferable to dilatation, as affording relief more speedily, permanently, and safely.

FISTULA IN PERINEO.

When the disease is complicated with *fistula in perineo*, the same treatment proves sufficient, as the sinuses, together with the callosities or induration surrounding them, speedily disappear after the obstruction which gave rise to them is removed. The incisions, excisions and

cauterizations, which were formerly practiced, are therefore both unnecessary and improper. If the urethra is altogether obstructed anterior to the fistula, so that even the smallest instrument cannot be passed through it, the only remedy is to introduce a catheter as far as the canal permits; and then cut down upon its extremity from the fistula, so as to allow its passage into the bladder. A flexible catheter should then be introduced, and allowed to remain for three or four days, to prevent the recent solution of continuity from healing by primary union; but it ought not to be left longer than this, as its presence would occasion a degree of irritation, unfavorable to the cure by granulating contraction. If the instrument is introduced occasionally, with the interval of a day or two, it will prevent any chance of the canal becoming again obstructed, and not interfere with the process of reparation.

Fistula in perineo is so frequently associated with stricture of the urethra, that a few remarks regarding it may not be out of place here, especially as there are some points in its history and treatment, respecting which the opinions usually entertained seem to admit of very serious question.

Sir B. Brodie says, "The urethra, constantly teased by the pressure of the urine against it, ulcerates behind the stricture." "A *fistula in ano* is formed in the same manner, by ulceration of the rectum allowing the escape of a minute quantity of feculent matter into the neighboring textures." * The opinion expressed in this extract from a source entitled to the greatest respect, though generally entertained, has long seemed to me entirely inconsistent with well-known facts of daily occurrence in the history of abscesses at the anus and in the perineum.

If the first step of this process in either case were ulceration through the lining membrane of the respective excretory canal, it might be expected that the entrance of urine or feculent matter into the cellular texture, would immediately occasion great swelling, intense pain, and violent constitutional disturbance, frequently, if not always fatal to the pati[illegible] and that in the event of his surviving, so as to afford time for t[illegible]uced. [illegible]blishment of an abscess, the cavity, when opened, would conta[illegible]and s[illegible]ixture of urine or intestinal matters with putrid fluids and fetid gas. But every surgeon who observes, without prejudice, what passes under his notice, must be fully aware that the abscesses which give rise to fistula *in ano* and *perineo*, usually originate in firm swellings, becoming, sooner or later, soft and fluctuating; and that, when opened early, they always discharge merely purulent contents, without admixture of matters proceeding from the

* On the Urinary Organs; 1849; p. 17.

neighboring canals. Without further argument, I would appeal to the facts just stated, and am quite willing that this question should be decided according to their accuracy, which every surgeon has it in his power to verify.

It is quite true that fistula *in ano* and *in perineo* are formed in the same way, the process being the same in both, but entirely different from that which Sir B. Brodie has described. The first step is the formation of an abscess, preceded by symptoms more or less acute, but generally so slight as to escape the patient's attention, which is usually not excited until the swelling attracts his notice. The matter is seated close to the external side of the mucous membrane, whether the rectum or urethra be concerned, and has no communication whatever with the interior of the canal. If not evacuated artificially, it sooner or later finds issue through progressive absorption of the surrounding textures. In the perineum, a direct outlet being opposed by the fascia which lies under the integuments of that part, the discharge usually takes place internally into the urethra; and if externally, in the hip or scrotum, beyond the limits of resistance thence offered. In the former case, the patient is exposed to imminent danger from the urine being urged into the cavity of the abscess with such force, by the contractile power of the bladder—especially when a stricture beyond the seat of communication obstructs the proper channel—as to break through the circumscribing wall of lymph, and diffuse itself with deadly effect through the neighboring textures. In the latter case, and also when the abscess has been opened by incision, there is no such risk. It is true that the thin denuded mucous membrane, though in the first instance remaining entire, is generally perforated by ulcerative absorption before long, indeed, seldom more than a few days after evacuation of the abscess. But then the parietes of the cavity are impervious to the urine which flows through, without obstruction in front, and without force from behind greater than is requisite for its discharge. Abscess at the anus, having no fascia to impede its course to the external surface, almost invariably discharges its contents through an opening in the integuments of the hip. If at this period the cavity be carefully exami[most] introducing a finger into the rectum and a probe into the sin[t sti]e abscess, it may be ascertained, if any doubt should remain, that the mucous lining is perfectly entire; although, as in the case of the urethra, perforation is almost sure to ensue subsequently, from ulceration of the thin detached membrane which has formed the inner wall of the abscess. The fistula *in ano*, however, does not become complete, or communicate with the mucous canal, so soon as that *in perineo*, often requiring several weeks for the accomplishment of this, especially when the abscess has been opened by a free incision.

Fistula *in perineo*, unless when complicated by some unusual cause of obstinacy, requires for its remedy nothing more than removal of the stricture connected with it, which, by causing irritation, gave rise to the abscess, and, after communication between the old and new canal, has directed the urine through the latter passage. When the stricture is remedied, and sometimes before it is entirely removed, the swelling and induration of the perineum disappear, the fistulous opening closes, and the urine resumes its natural course.

Case I.—W. W., aged forty-eight, late boatswain of H. M. S.,—— was admitted into University College hospital, on the 8th of April under my care, recommended by the first Lord of the Admiralty, Lord Auckland, who felt interested in him on account of the excellent character which he had borne in the service. His complaint was fistula *in perineo*, with stricture of the urethra—the former ailment being of three, and the latter of thirteen years' standing. Although considerably relieved in the earlier period of his sufferings by the introduction of bougies, he stated that, notwithstanding prolonged and repeated attempts by various surgeons afloat and on shore, no instrument had been passed into the bladder for the last nine years. More than half of his urine escaped by the fistulous opening, and what issued by the urethra, did so in drops merely. In these circumstances, greatly to his regret, he had finally been discharged as unfit for duty. The following extract from the hospital record, will show the steps of his progress:

"*April* 8.—Mr. Syme introduced No. 1, metallic bougie, into the bladder. There are two strictures, one about two inches and a half from the orifice, and the other, which is tighter, at the bulb.

"9.—No pain or irritation of urethra.

"10.—No. 2 bougie passed the first stricture after No. 1 had entered the bladder and been withdrawn.

"12.—Nos. 1 and 2, passed easily into the bladder. Patient much easier than formerly, being up at night twice or thrice, instead of ten or twelve times.

"15.—No. 3 introduced.

"19.—Has a cough and sore throat, with fever.

"24.—Better, but cough remains. No. 5 passed the first stricture; No. 4 entered the bladder.

"28.—Has an attack of erysipelas, beginning at the nose.

"*May* 15.—Mr. Syme has passed bougies up to No. 7; very little water comes by the perineum.

"29.—No. 10 bougie has been passed. *All* the urine comes by the penis in a good stream, and sometimes nearly a pint at a time. He is anxious to go home, and is dismissed *cured*."

He left the hospital in the hope of being reinstated in the service; and the last time I saw him was with this view, addressing a petition to Lord Auckland. It thus appears that notwithstanding considerable delay from repeated attacks of illness altogether accidental, and nowise connected with the treatment of the case, recovery was completed, simply through introduction of the bougie, in little more than six weeks.

Case II.—A. W., aged twenty-four, from Glasgow, late of the —— regiment of foot, was admitted into the Royal Infirmary on the 28th of August last, for stricture of the urethra, with a fistula in perineo, through which fully one half of his urine was discharged. He stated, that soon after entering the army, about five years ago, when stationed at Cork, he had contracted a gonorrhea, and sailing with it to Gibraltar, suffered there from the symptoms of stricture. After having been three months in hospital on this account, with imperfect relief, he had resumed duty for four months, and then sailed for the West Indies. On the voyage a swelling formed in the perineum, and opened spontaneously, discharging in the first instance matter alone, but after a few days urine also. On arriving at the island of his destination, he was four months in hospital, being treated with ointments and injections, but without ever having an instrument passed through the stricture. He was then sent home, and after remaining a month at Chatham, where some unsuccessful attempts were made to pass bougies, appeared before a medical board, and was dismissed, as unfit for service, with a pension for twelve months.

On the day of his admission, I passed a bougie without any difficulty into the bladder, and carried on the dilatation without interruption, so that before the end of three weeks, the full-sized instrument was passed, and the urine ceased entirely to escape by the fistulous opening. He was dismissed cured on the 20th September.

But the stricture associated with fistula *in perineo*, like that existing independently of any such complication, may possess the contractile disposition so strongly as to resist dilatation, and require the perineal incision.

Case III.—W. R., aged forty-five, was admitted into the Royal Infirmary on the 15th of November, on account of fistula *in perineo*, with stricture of the urethra, from which he had suffered more than twenty years, in consequence of an injury sustained from a fall of earth upon him while working in a quarry. The immediate effect had been inability to pass his water, which rendered it necessary to request surgical assistance. He was then relieved by the catheter, and had the instrument introduced occasionally during the three succeed-

ing months. About a year afterward, an abscess formed in the perineum, and laid the foundation of a fistulous opening through which the greater part of his water escaped. Two years after the accident, he underwent an operation in Guy's Hospital (London) for the remedy of the fistula, by cutting upon the point of a catheter at the seat of obstruction. This proceeding was so far beneficial, that it closed the opening, but did not remove the stricture, which continued to occasion more or less trouble, until at length the fistula reopened, when all the symptoms of his complaint became greatly aggravated, and induced him to apply in various quarters for relief.

Upon examination, it appeared that there was a stricture at the bulb, so tight as to admit only an instrument of the smallest size, and that there was an opening in the perineum through which the whole of his water passed, without the power of retention, so that his clothes were saturated with urine. The treatment by dilatation was commenced, and carried on several stages, but without producing any relief of the symptoms, and with increasing difficulty, instead of facility, in the introduction of bougies. It, therefore, seemed expedient to divide the contracted part of the canal, which was accordingly done on the 13th of January, the incision being made on a grooved director, and a full-sized silver catheter secured in the passage. On the 15th, the catheter was withdrawn, and the patient immediately regained the power of natural evacuation, together with that of retention, so as at once to be completely relieved from all his complaints. A bougie was occasionally introduced afterward, without the slightest perception of tightness or obstruction, and the patient left the hospital on the 7th of February.

There is another condition of the disease still more embarrassing under the ordinary means of treatment. In this case, the fistula proves obstinate and admits of no improvement, although not accompanied by a stricture, either from their not having been one in the first instance, or from its having been remedied without the effect of closing the preternatural canal. The state of the patient's general health, or disease in some other part of the body, may on some occasions account for this obstinacy; but when it is not referable to any such source, I am persuaded that its cause must be attributed to the situation of the orifice through which the contents of the abscess were discharged, whether this has taken place naturally or artificially. In the former case, a direct outlet is prevented by the fascia of the perineum; and in the latter, there is a baneful habit of cutting at the left side of the perineum as if for lithotomy, instead of the raphe or middle line, where incisions should always be made for the evacuation of matter lying under the fascia. But as in cases otherwise free from complication the obstinacy in question is never met with when the abscess has

been opened by a free incision in the middle line, it may be reasonably expected that the formation of such a free and dependent drain should still suffice for the patient's relief, when there does not appear to be any obstacle in the way of his recovery, except the tortuous direction of the fistulous canal.

Case IV.—E. M., aged forty-one, a plasterer, was admitted into the Royal Infirmary on the 13th of November last, on account of urinary irritation, and inability to pass his urine through the natural channel. He stated, that about nineteen years ago he had fallen across a beam of wood, and bruised his perineum, which injury was accompanied by a slight discharge of blood from the urethra, and, for a few days, by retention of urine, requiring the catheter to be introduced. A small induration gradually formed in the perineum, behind the scrotum, and about seven years ago he had again retention for several days. Three years since he suffered from a similar attack, and subsequently has experienced more or less difficulty and pain in passing urine, with enlargement and increased uneasiness of the perineal swelling. More recently he was admitted into the hospital under the care of the late senior ordinary surgeon, for relief from stricture of the urethra. Bougies were passed regularly, and under this treatment the hardness in the perineum nearly disappear. After a residence of five weeks, he was dismissed almost quite well. Soon after leaving the hospital, he was exposed to cold and wet, and his complaints returned with increased severity. The swelling of the perineum and scrotum enlarged rapidly. An abscess formed, and a considerable quantity of matter was evacuated by incision; and in a few days the urine began to escape through the opening thus made.

At the period of his final admission (13th November), there was great induration of the perineum and scrotum, with two fistulous openings about an inch from each other, through one of which the chief part of his urine escaped. The patient, from long suffering and disturbance of sleep, which he was not permitted to enjoy for more than a few minutes at a time, was extremely irritable and desponding, and derived no benefit from the introduction of instruments through the stricture, which was situated about five inches from the orifice of the urethra.

On the 20th, I introduced a grooved staff into the urethra, and cut upon it in the perineum through the contracted part, making an incision about two inches in length. A full-sized catheter was then introduced, and retained in the bladder. The catheter was withdrawn at the end of forty-eight hours, after which the patient did not make a drop of water through the wound, and was at once completely relieved from all his previous sufferings. He quickly regained his sleep,

appetite, and strength, and was dismissed cured on the 2d of December.

RETENTION OF URINE FROM BLOWS ON THE PERINEUM.

Blows on the perineum are apt to occasion difficulty or total obstruction of the urinary evacuation. In some cases, there is no solution of continuity effected by the violence, no wound of the integuments, or rupture of the parts within, but merely, as it seems, a temporary paralysis, or want of consent in the muscles concerned, in consequence of the contusion. At other times, the urethra is torn; blood streams from the orifice of the penis; not a drop of urine can escape; and a tumor is formed under the integuments of the perineum opposite the injured parts, by blood and urine.

The treatment of such injuries is obvious, and not difficult. If there is no evidence of the urethra being ruptured, it may be expected that rest, warm fomentations, and slightly stimulating injections thrown into the rectum, will soon restore the healthy actions which have been disturbed; and, should circumstances require it, a catheter may be introduced with the same facility as usual, to relieve the bladder from distension. For some time after such injuries, a bougie should be passed occasionally to prevent contraction of the canal, which is apt to happen in consequence of the irritation caused by the blow. But if, from the discharge of blood, the tension of the perineum, and the impossibility which is experienced in attempting to introduce a catheter, it is ascertained that the urethra has been ruptured, means must be taken, without delay, to provide for the evacuation of the urine, which cannot be expected to take place naturally, and to prevent the fluid from passing extensively into the cellular substance through the breach of the urethra, which would necessarily lead to the most disastrous consequences. The best mode of proceeding is to cut into the perineal tumor, and then having brought the ruptured canal into view, to convey a flexible catheter into the bladder. It may be allowed to remain for a few days, as in the case of operating for *fistula in perineo* with obstructed urethra, and the subsequent treatment does not differ from that which is proper in these circumstances.

DISEASES OF THE PROSTATE GLAND.

The Prostate Gland is little subject to disease previous to the age of fifty-five or sixty. It is then liable to an enlargement, which in its nature most agrees with the simple vascular sarcoma, and though often named scirrhus, has none of the characters of carcinomatous formations except an approach to their hardness. The tumor is dense and fibrous; possesses little sensibility; is not disposed to any morbid action except its own nutrition; and though the cause of uneasiness by

its pressure on the neighboring parts, is hardly ever itself the seat of much pain. The gland seldom enlarges equally, generally exceeding in one of the lateral lobes, and not unfrequently sending a round process upward, encroaching on the cavity of the bladder, immediately behind its neck. Sir E. Home accounted for this marked limitation of the growth to one part of the gland, by attributing it to the existence of a distinct *middle* lobe of the prostate; but in a healthy state of the part it is difficult to discern any trace of such a structure. Whatever be the true explanation of the fact, it is an important one in several points of view. Enlargement of the prostate, whether partial or general, does not necessarily or usually diminish the width of the urethra, but alters the direction of the canal, so as to impede more or less the passage of the urine. When the whole gland swells, the neck of the bladder is, of course, elevated in a proportional degree, and the course of the urethra consequently rendered not only longer, but more curved than natural. If one of the lateral lobes is more enlarged than the other, it gives the canal a bend to one side, and if the tumor is confined to the upper surface of the gland, within the orifice of the bladder, though the urethra cannot suffer any change, the excretion of urine may be considerably impeded.

The symptoms of enlarged prostate are: 1. A feeling of weight and uneasiness in the lower part of the pelvis; 2. Pain and difficulty in evacuating the bowels, with, it has been said, a flattened form of the fæces when passed in a solid consistence; 3. Frequent and slow micturition; 4. A copious discharge of mucus with the urine, at the bottom of which it remains separate, forming a glairy mass that adheres to the vessel when the water is poured out; 5. A fetid ammoniacal smell of the urine. These symptoms, though in general always distinguishable, are seldom very well marked, except when the urinary organs suffer irritation from a local or constitutional cause. They then become greatly aggravated, and constitute what is called a fit of the disease, during which the patient has an almost incessant desire to empty his bladder, experiences extreme pain in attempting to do so, and sometimes labors under a complete retention of urine. Considerable information may usually be obtained as to the existence and degree of the enlargement, by examining the gland with the finger in the rectum, after a catheter or bougie has been introduced into the bladder. Unless this precaution be taken, the prostate is very apt to be thought enlarged when it is not altered in size.

The cause of the disease, as might be expected, seems to be excitement of the gland, either directly, or through sympathy with the neighboring parts; and it is accordingly observed chiefly in those who indulge in venereal excesses; who use a luxurious diet; or who are exposed to the stimulating influence of a warm climate. It occurs

much more frequently in persons whose circumstances are easy than in the laboring poor.

[This disease frequently results from a badly-treated case of gonorrhea; and occurs much more frequently in practice than we suspect.—R. S. N.]

The treatment of enlarged prostate obviously requires the prevention, so far as possible, of all circumstances tending to promote its increase. With this view, the patient should live sparingly—scrupulously avoiding all articles of food and drink which he knows from experience have a stimulating effect on the organs connected with the gland; take gentle exercise; and preserve the bowels in an easy state, by means, if necessary, of gentle laxatives, or injections of mild fluids into the rectum.

During the paroxysms of the disease, rest in the horizontal posture, the hip-bath, leeches applied to the perineum, small doses of laudanum, or solution of the muriate of morphia, with a few drops of balsam of copaiba, opiate injections into the rectum, and a diet restricted to little more than mucilaginous drinks, are the means which prove most effectual in affording relief. Should the flow of urine not only be rendered difficult, but be altogether impeded, it may become necessary to introduce the catheter. The instrument selected should be of a medium size, about thirteen and a half inches long, and curved, so as to ascend from the bulb of the urethra in the direction which the canal takes from that point to the bladder, in consequence of the elevation of the vesical extremity by the swelling of the prostate. If the catheter is flexible the stilet ought to be curved in a similar way; and by withdrawing it a little when the beak of the instrument has passed the bulb, the curvature of the tube may be increased so as to favor the introduction. When much difficulty has been experienced in introducing the catheter, it should be allowed to remain in the bladder for a day or two. Various medicines have been employed to induce absorption of the tumor, as iodine and the muriate of lime, but no real advantage has ever been derived from these means. It has also been proposed to cut out the enlarged prostate; but this proceeding is so inconsistent with the dictates of rational surgery, that the objections to it need not be taken into consideration.

Earthy concretions are not unfrequently found in the ducts of the prostate. They are generally of a very small size, which only in rare cases equals that of a pea, of a rounded figure, and reddish-brown color. Their composition is invariably phosphate of lime, with a little animal matter. They usually exist in great numbers together; being either imbedded in the substance of the gland, or collected into groups which occupy the dilated ducts. The symptoms which they occasion are not well ascertained, since their existence is seldom known

until it is discovered after death by dissection. No means can be employed either for their prevention or remedy; unless they should be distinctly perceptible from the rectum, when an incision may be made in the perineum, similar to that which will be particularly explained in regard to the extraction of stones from the bladder, so as to afford vent for their escape. Such an operation, however, would not be warrantable, unless the patient were suffering great and increasing inconvenience from the pain of the calculi. On one occasion having cut into the membranous part of the urethra to remove a concretion that lay there, I found the postate hollowed out into a cavity containing calculi, which were extracted with success.

[To effect a radical cure of this disease we must rely upon alteratives and such other agents as give tone and vigor to the entire glandular system. As the disease usually depends upon an irritated condition of its lining membranes, I should certainly object to the use of capaiba. Nor need we expect to benefit the patient if he will persist in sexual indulgence.—R. S. N.]

EXTRAVASATION OF URINE, AND PUNCTURE OF THE BLADDER.

When retention of urine, from whatever cause it may proceed, is not remedied, the pressure occasioned by the confined fluid at length induces ulcerative absorption, and forms a breach which allows the urine to escape into the surrounding cellular substance. This rupture, as it is improperly termed, usually takes place immediately above the obstruction; and as most cases of complete retention depend on stricture at the bulb, the aperture generally occurs in the membranous part of the urethra. When the bladder gives way in such circumstances, it does so most frequently near the neck, where there is no covering of peritoneum. The urine no sooner begins to flow through the preternatural channel, than the patient experiences relief from the distress he previously suffered, and can hardly be persuaded that he is not making water in the ordinary way. The extravasated fluid may diffuse itself in all directions—upward between the bladder and pubis, latterly by the sides of the prostate, and downward into the scrotum. The fascia, which lies under the integuments of the perineum, prevents the formation of any tumor in this situation; but, when the fluid gets through the less dense membrane opposite the scrotum, it speedily distends the loose cellular substance, and produces a large globular swelling, which pits when subjected to pressure. The urine, after being thus effused, soon excites great irritation, the effects of which are intense local inflammation, and constitutional disturbance of the most alarming character. The distended scrotum becomes first red, and before many hours black, while the system suffers as if influenced by some deadly poison; a quick small pulse; dark-colored

tongue; frequent vomiting; incessant hiccup; and low delirium, are the indications which betray this dangerous condition; and death soon closes the scene unless some active means of relief are speedily and successfully administered. A free incision should be made in the perineum, through the fascia, and down to the infiltrated cellular substance. The scrotum may be scarified also, and hot fomentations ought to be applied to promote the discharge of putrid urine, blood, and sloughs; while, at the same time, the patient's strength is diligently supported by wine and other cordials. If the urine has insinuated itself extensively into the cellular substance of the pelvis, all these means will be unavailing, but if it has been chiefly confined to the scrotum and neighborhood, a cure may be accomplished with careful management, and after a long confinement. A surgeon should never hesitate to make free incisions in such cases, however desperate they may at first appear, since recoveries have taken place in apparently the most hopeless circumstances, when extensive sloughing was complicated with the weakness of old age.

In some rare cases, the opening is formed into the rectum, and then the patient may escape the dangerous consequences of urinous effusion which have been described; but such an occurrence is too rare to afford any reasonable ground for expecting relief from the unaided powers of the system, or withholding the means that effect evacuation more safely. These means consist in puncturing the bladder, so as to draw off its contents without allowing them to enter the cellular substance. If the surgeon possesses the requisite tact for introducing instruments into the bladder through the urethra, and has the treatment of the case from its commencement, he will very rarely, perhaps never, be under the necessity of resorting to this puncture. But should he not be able to draw off the water by the catheter, either from his own want of dexterity, or from the existence of obstacles arising from mismanagement or previous organic alteration of the passage, as stricture, or enlargement of the prostate, complicated with a lacerated, softened, swelled, and bleeding state of the lining membrane, caused by forcible attempts to pass an instrument, there can be no hesitation in having recourse to the operation. Puncture of the bladder, however performed, is always attended with more or less danger of urinous infiltration; but a doubtful remedy is better than none; and there are few states of disease more hopeless than complete retention of urine, permitted to follow its own course.

There are three methods of puncturing the bladder: 1. Above the pubis; 2. By the perineum; 3. From the rectum. The operation above the pubis is performed by making an incision an inch and a half long from the symphis upward, exactly in the mesial plane, and then separating the edges of the recti, or rather pyramidal muscles,

with the fingers and a little assistance from the knife, and lastly pushing a trocar into the distended bladder, which can now be distinctly felt. In order to avoid transfixing the neck, it is necessary to direct the instrument not perpendicularly, but obliquely backward, from the point where it enters the cavity behind the pubis. The rigidity of a silver tube is apt to occasion injurious irritation, particularly as it must be long, and deeply introduced, to prevent any risk of its escape from the contraction of the coats of the bladder; but the canula must not be withdrawn without substituting some other channel for carrying away the urine, which otherwise would be very apt to enter the cellular substance. A piece of flexible catheter answers very conveniently for the purpose, and the exchange should not be effected before the end of at least twenty-four hours. The patient should lie on his side, inclining forward, to promote the discharge of urine; and great care must be taken that the tube does not become obstructed by mucus, or in any other way. When the cellular substance surrounding the wound has become consolidated by adhesive effusion, as happens in a day or two, a plug may be fitted into the orifice of the canula, and withdrawn from time to time; but it generally happens that the old passage is soon restored, after the bladder has been freed from the irritation of its accumulated contents.

The bladder may be punctured from the perineum, by making a deep incision, a little to one side of a line extending from the bulb to the anus, and then pushing a long curved trocar inward in the direction of the neck of the bladder, so as to open it nearly in the same situation as when operating in the former way. There is thus a more dependent opening provided for the escape of the urine; but the operation is severe, difficult, and very dangerous in the hands of a surgeon not perfectly familiar with the relative situation of the parts concerned.

Puncturing from the rectum may have been suggested by the opening which is sometimes formed naturally between it and the bladder, or prostatic portion of the urethra. In cases of complete retention, where the parts are not altered by disease, there can certainly be no easier or more satisfactory mode of relieving the patient by operation. The bladder behind the prostate, for the extent of an inch or more, is not covered with peritoneum; and the *vesiculæ seminales*, though they meet together at the gland, diverge from each other in proceeding backward, so as to leave sufficient space for the puncture. The *vasa deferentia* lie near the center, and may perhaps be injured, even though the trocar is introduced exactly in the mesial plane; but any inconvenience that might be expected to result from this source ought not to be regarded as a serious objection to a proceeding which affords the only means of averting nearly certain death, especially as experi-

ence does not confirm the apprehension. When the operation is performed, the patient should be laid on his back, at the edge of the bed, with his knees bent and thighs held up, so as to present the parts fairly to the surgeon, who, having anointed the fore and middle fingers of his left hand, introduces them gently into the rectum until he feels the posterior confines of the prostate. The trocar, which should be six inches long and curved, is then carried in along the channel formed by the fingers, and when its point has passed beyond the prostate, the handle is depressed, so as to puncture the coats of the rectum and bladder where they are contiguous. The canula should be secured in its place for twenty-four or forty-eight hours, to prevent the wound from closing, before the obstruction that existed in the natural passage has been removed.

In deciding upon the choice of these operations, there can be no doubt that, when the prostate is not enlarged, the one last-mentioned ought to be preferred as being the easiest, least painful, and most free from the danger of extravasation. When the prostate is enlarged, the operation by the rectum being impracticable, the puncture should be made above the pubis, unless the surgeon thinks it better to force a passage through the substance of the gland. This proceeding may appear harsh; but experience shows that the wound thus made may heal; and if it be recollected that the catheter may always be passed in cases of obstruction dependent upon enlargement of the prostate, unless the surface of the tortuous canal be poached and torn by the forcible use of instruments, and that, in this case, the substance of the gland is already injured nearly as much as it would be by having the catheter thrust through it, the proposal will not seem unwarrantable.

In cases of stricture preventing the introduction of a catheter, Sir A. Cooper recommends, as preferable to puncturing the bladder, making an incision in the perineum, and cutting upon the membranous part of the urethra, which, owing to its distension behind the obstruction, may be distinguished and opened, so as to establish a *fistula in perineo*, that can be remedied at leisure by curing the stricture. The objection to this practice is the difficulty attending its execution.

URINARY CALCULI.

The bladder and other parts of the urinary passage frequently become the seat of concretions, which vary extremely in their number, size, and composition, but almost always occasion very distressing symptoms. The measures which have been devised for their prevention and removal consequently demand much attention; and in order to understand them, it is necessary to be first acquainted with the origin and mode of formation of the different kinds of calculi.

The urine, in its healthy state, holds a number of saline substances

in solution, which it deposits, in part, on cooling to the ordinary temperature. The quantity of this precipitate varies according to the degree in which the urine is diluted, being most observable after abstinence from drinking, or profuse perspiration. It generally appears in the form of a light-colored yellowish cloud, occupying the lower part of the vessel, or in that of a thin crust or lining, which adheres to its sides. When chemically examined, the light-colored, muddy-looking sediment is found to consist of alkaline and earthy salts, which are chiefly the phosphate of lime, and the triple phosphate of magnesia and ammonia—the lateritious or crusted deposit, on the contrary, consisting of uric acid, or urate of ammonia with an excess of acid. In consequence of a variety of circumstances, which will be more particularly considered hereafter, the urine becomes loaded with these matters in quantities, proportions, and combinations, that give rise to concretions of various kinds. It appears that the fluid is sometimes secreted so overburdened with its acid or saline constituents, as to deposit them immediately on escaping into the pelvis of the kidney, and form concretions, consisting by far most frequently of uric acid, but sometimes of the oxalate of lime. If the urine is not so loaded as to free itself immediately after being secreted, it does not afford any deposition so long as it is kept within the body and maintained at its temperature; but when it is excreted and cooled down to the temperature of the air, it deposits all the redundant portion in the form of a copious muddy yellowish-white precipitate, containing the earthy salts—and a lateritious crust consisting of the acids and acidulous combinations of ammonia. If, however, while such an excess of the urinary constituents exists, a foreign body should be present in the bladder, or in any other part of the passage through which the urine flows, so as to serve as a nucleus for concretion, it will, on the well known principle observed to regulate the separation of salts from their solvents, whether in a crystalized form or not, induce the redundant matters to withdraw themselves from the attraction of the fluid, and adhere to the surface which is presented to them. This effect, however, can occur only where there is a considerable excess of saline substance, since, when the proportion is small, it is retained in solution by the urine at the high temperature which it has in the bladder, too powerfully to permit its precipitation by the influence of a foreign body. Urinary calculi, which have attained any considerable size, are hence found to consist of concentric layers, varying in composition and thickness, according to the nature and quantity of the morbid excess that existed in the urine at the time of their formation; and for the same reason, the rapidity with which they increase in size always bears a direct proportion to the derangement of the urinary secretion.

The circumstances which tend to occasion excess in the acid and

saline constituents of the urine are chiefly the following: 1. Imperfect digestion, attended with acidity of stomach; in which case the urine has a deep brownish-red color, and deposits either crystallized grains of uric acid that have separated from the fluid in the kidney, or a red lateritious sediment on cooling; 2. An irritated state of the kidneys, attended with pain of the loins, quickness of the pulse, and anxiety of the countenance; in which case the urine is copious, pale-colored, and deposits such a quantity of the phosphates on cooling as to become turbid and white, like milk; 3. A similar state of irritation, chiefly affecting the bladder, and attended with a copious secretion of mucus; in which case the urine has a very disagreeable ammonical odor, and deposits the triple phosphate of magnesia and ammonia, either crystallized or amorphous. The condition of the urine during the deposition of oxalate of lime, and some animal substances that will be mentioned hereafter, has not yet been well ascertained.

[The researches of Dr. Golding Bird have, however, gone very far toward giving us a correct theory for their formation. His work should be in the hands of every practitioner.—R. S. N.]

From an attentive consideration of these circumstances, it appears that the presence of a calculus may promote the formation of concretions from the urine: 1. By affording a nucleus; 2. By irritating the bladder, increasing the quantity of mucus, and accelerating the putrefactive decomposition of the urine, during which the urea is converted into ammonia, and an excess of the triple phosphate results; 3. By causing sympathetic irritation of the kidneys, which perverts their secreting action, and leads to the formation of the earthly salts in redundant quantity; 4. By sympathetically irritating the stomach, and occasioning imperfect digestion, attended with acidity. By operating in one or more of these modes, the nucleus, when once formed, always increases, and even tends to cause the generation of new ones. The nucleus, unless when consisting of a foreign body introduced into the bladder, is almost invariably constituted by a concretion formed in the kidney. This renal calculus, in the great majority of cases, as has been already observed, is an aggregation of uric acid grains, but may also consist of oxalate of lime. It is often observed by patients, that previously suffering from the symptoms of calculus, they were accustomed to pass red grains of uric acid—sand or gravel as they are usually called—and that they ceased to do so for some time before the commencement of their complaint. It is extremely difficult to account for the origin of these concretions, farther than has been already done, though there are doubtless some important causes in operation, which hitherto have not been ascertained. Calculous diseases are much more common in some districts of country than others, and all that we know in regard to the difference of these is,

that where the strongest predisposition has been observed, the mineral strata of the neighborhood were of a calcareous nature. The formation of renal nuclei takes place most frequently before puberty, and after the age of fifty; but no time of life is altogether exempt from it. There is no temperament or variety of original constitution that seems particularly favorable to the occurrence of the disease, but there is occasionally observed some evidence of the predisposition being hereditary. Gout and stone are often connected, but they probably are so from owing their origin to the same source, viz: derangement of the digestive organs.

The symptoms of a calculus in the kidney are an almost constant feeling of uneasiness in the loins, aggravated by rough motion, and soothed by rest; the discharge of small fibrinous clots with the urine after fits of irritation, and during their continuance, tenderness of the loins, nausea or vomiting, and frequent desire to make water, which is sometimes attended with pain at the point of the penis. If, while there are such symptoms, the bladder should be examined, and found to contain no calculus, there will be strong ground of suspicion that one exists in the kidney; but there can hardly be any certainty acquired on the subject, as different morbid states not only of the kidney, but also of other parts of the urinary apparatus, produce nearly, if not altogether, the same indications.

The object of treatment in this case is to promote the descent of the calculus into the bladder, with which view the patient should take exercise, and drink largely of diluent fluids. Advantage seems sometimes derived from conjoining the latter with a small quantity of spirits, such as Hollands, or with the tincture of cantharides; but caution must be observed in doing so lest too much excitement be occasioned. The calculus, if it remain in the pelvis of the kidney, does not increase rapidly in size, as the urine from passing away through the ureter immediately after being secreted, has little time to deposit the excess of solid matters which it may contain. Sometimes, however, the concretion of uric acid enlarges so as to occupy the whole pelvis and infundibula, branching out like a piece of coral, or becomes incrusted with the triple phosphate. Much more frequently the calculus remains of a small size, ranging from that of a pea to that of a field bean, of an oval figure, very similar to the stone of an olive, and smooth reddish-brown surface, in which the component grains may in general be distinguished. In some rare cases abscesses have been produced by the irritation of the kidney, and in others still more rare, the matter, by inducing absorption of the parietes of the abdomen, has made a passage outward for the stone. Exaggerated reports of such occurrences have given rise stories of renal calculi having been cut out, and Nephrotomy has been seriously proposed by surgeons

who think more of the execution than the consequences of operations.

[When the physician is called to the bed-side to investigate disease, it becomes him not only to examine well every symptom presented by the patient, but every indication afforded by the secretions and excretions. To form a correct diagnosis, an examination of the urine is of great importance. In these examinations two perceptible conditions are presented—urine depositing a visible substance, and that which does not form any deposit.

URINE WITHOUT ANY VISIBLE DEPOSIT.

In order to test the urine, place a piece of litmus paper in the urine; if it be acid, the blue color of the paper will be changed to red. Should no change occur, a piece of reddened litmus paper must be dipped in, and if the secretions be alkaline, its blue color will be restored; if there be no change the urine is neutral. By heating a portion of the urine in a spoon or test tube, over a spirit lamp, if a white deposit occur, albumen or earthy phosphates are present; if it be albumen, nitric acid will not re-dissolve the deposit, but if a phosphate, it will be dissolved.

If the urine be very high colored, and undergoes no change by boiling, the coloring matters of bile, blood, and purpurine are present. This may be determined by pouring on a thin layer of urine a few drops of nitric acid; if bile be present, an immediate and rapid play of colors, from red to green will occur; no such change takes place with purpurine; if blood be present, the high colored urine will be changed by gentle heat. The existence of uric acid may be determined by adding a few drops of nitric acid, which will produce a brown deposit; if a white deposit is formed, albumen is present; if effervescence take place, after the addition of the acid, it has been changed into carbonate of ammonia.

URINE DEPOSITING A VISIBLE SEDIMENT.

If the deposit does not disappear after the addition of nitric acid, and is flocculent, easily diffused by agitation, it is chiefly made up of healthy mucus, if the deposit is ropy, and is partly dissolved by the acid, it is a phosphate; if it is slightly affected it is mucus. If the deposit be pus, it will fall in creamy layers to the bottom of the vessel, while the supernatant urine is coagulated by heat. If the deposit is white, it consists of urate of ammonia, phosphates, or cystine; the first disappears by heat, the second by nitric acid, and the third dissolves in ammonia. If the deposit be colored, it consists of red particles of blood, uric acid, or urate of ammonia stained with purpurine. If the first the urine becomes opaque with heat, if the second,

the deposit is in visible crystals (see Figure 119), if the third, the deposit is amorphous, and dissolves on heating the fluid.

Much time may be saved in this investigation, by bearing in mind the following facts: If the deposit be white and the urine acid, it consists of urate of ammonia; but if it should not disappear by heat, it is phosphatic. If a deposit be of any color inclining to yellow, drab, pink, or red, it is sure to be urate of ammonia, unless crystalline, then it is uric acid.

The only apparatus and tests required for these investigations at the bed-side are a gravimeter, made small enough to float in an ounce of fluid, red and blue litmus paper, a test tube, watch-glass, and nitric acid.

CHEMICAL PATHOLOGY OF URIC ACID AND ITS COMBINATIONS.

When aric acid occurs in urinary deposits, uncombined with a base, it is invariably in a crystalline form, never occuring in the state of an impalpable amorphous powder. The crystals are large enough to be determined in general by the eye, and in all cases by the microscope. Uric acid never occurs quite colorless, excepting mixed with urate of ammonia, which is frequently the case. Every shade of intensity of tint is found in these deposits; hence the term red or yellow sand is applied to them. In general, the deeper the color of the urine, the darker the sediment.

DIAGNOSIS OF URIC ACID DEPOSITS.

When heated in the urine, the uric acid deposit does not dissolve—the crystals merely become opaque. It generally becomes more distinct from the solution of the urate of ammonia, which is frequently mixed with it, and sometimes completely conceals it from view. Hence, the best mode of discerning this deposit is to warm urine turbid with urate of ammonia, in a watch-glass. The acid becomes visible on the glass as soon as the urate dissolves. Liquor potassæ will dissolve the urate of ammonia, by the formation of the urate of potassa. Hydrochloric and acetic acids have no action, while the nitric readily dissolves it.

CHARACTER OF URINE DEPOSITING URIC ACID.

When this acid is found in excess in the urine, it lets fall crystals on cooling. Very high colored urine seldom deposits uric acid until after the addition of a stronger acid. Urine never lets fall all its uric acid spontaneously as a deposit. Urine depositing uric acid always reddens litmus paper, and often contains an excess of urea, so as to crystallize slowly when mixed with nitric acid in a watch-glass.

MICROSCOPIC CHARACTERS.

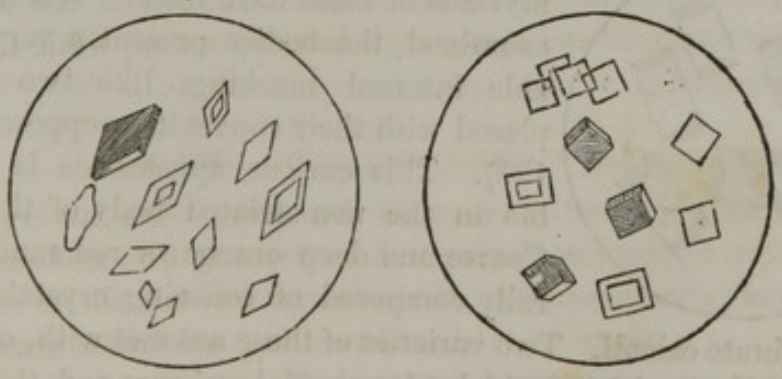
The crystallized forms of the uric acid present a remarkable variety; they all have the rhomboid prism, which may be considered the normal crystalline form of this substance.

Two varieties can be formed artificially by filtering a strong solution of urate of potassa, or ammonia, into dilute and warm hydrochloric acid; perfect rhomboids, or square tables (often excavated at the sides into an imperfect hour-glass figure) are obtained. These varieties depend upon the strength of the acids and urates used.

If the crystalline form exist in the deposit, they can be examined by placing a drop of turbid urine on a plate of glass, and examining it under a small microscope; but the best way is to allow the urine to settle, and then pour a tablespoonful of the lower portion, that which is the most turbid, into a watch-glass; by warming this gently, the urate of ammonia is dissolved, and the deposit is readily formed. Remove the supernatant urine, and add a few drops of water, then place the glass under the microscope, and the crystals covered with the water become very distinct. They may be examined by transmitted rays or reflected light, the latter having some advantages when the crystals are large or in masses. All that is then required is to place on the stage of the microscope, and under the watch-glass, a piece of black velvet; by means of a condensing lens, let a strong light be thrown upon the crystals; then bring the object-glass into proper adjustment, and the color, as well as the figure of the crystals, will become beautifully defined on a black ground. In the following microscopic views, all the larger crystals are thus represented. The accompanying cuts are copied from the work of Dr. Bird on urinary diseases.

In figure 119 are represented the common rhomboidal crystals of uric acid; these are generally found to be very thin, and sometimes

Fig 119. *Fig.* 120.



of a lozenge-shaped lamina, but again they are thicker, and by adjusting the light, their true shape may be well defined.

When the deposit has been of long continuance, especially in calculous diseases, the rhomboid outline of the crystal is replaced by a square one (see Figure 120).

The deposit is then generally high colored, and the crystals much thicker than in the former variety. In this an internal marking, like a frame work, is visible. Several accidental varieties of these rhomboid and square crystals exist; of these the most curious presents a spindle-like figure, the obtuse end being rounded—the margin of either side excavated (Figure 121), so as sometimes to approach a *fleur-de-lis* outline. Many uric deposits appear at first sight to be made up

Fig. 121.



Fig. 122.



of flattened cylinders, presenting a very remarkable appearance (Figure 122). Upon making them roll over, by adding a few drops of alcohol, or by agitation, the fallacy will be detected, they being really very thick lozenges, lying on their sides. This variety is frequently found mixed with urate of ammonia and oxalate of lime. The addition of hydrochloric acid to urine often causes a precipitation of crystals of this form.

The crystals are sometimes found very thin, their length being greater than their breadth, and much resembling a bundle of irregular needles, as well as a block-like shape. The whole surface is sometimes marked with myriads of close dark lines. When carefully examined, the bodies present a very remarkable internal marking, like two crescents placed with their convexities opposed (Figure 123). This curious appearance is only visible in the non-striated body of the crystal. Coarse and deep orange or red sand is generally composed of cohering crystals, forming indeed minute calculi. Two varieties of these are met with, one formed (Figure 124) of cohering, thick, rhomboidal prisms, and the other of aggregated lozenges, in spinous masses. The latter are particularly met with where a marked tendency to caculi exists (Figure 125). It

Fig. 123.



is not unfrequent to find these masses crystallized on a hair, just as sugar-candy is crystallized on a thread or string.

Fig. 124.



Fig. 125.



DIAGNOSIS OF DEPOSITS OF URATE OF AMMONIA.

These deposits vary in color from absolute whiteness to a pale fawn color, which is the most frequent tint, brick-red, pink, or purple. All these various colored deposits present certain characters in common. They never appear in the urine until after it has cooled, and disappear with the greatest readiness on the application of heat. The purple deposits require rather a higher temperature for solution than the other. The liquor potassæ, or liquor ammoniæ, will immediately dissolve the urate of ammonia. Their chemical constitution is shown in a very interesting manner by examining a drop of the turbid urine with the microscope, between two plates of glass; an amorphous powder will alone be visible, unless uric acid be present; then, by adding a drop of hydrochloric acid, the turbidity will disappear, and, in a short time, crystals of uric acid will be seen, growing in the fluid, the ammonia having unitied with the hydrochloric acid that was added, and deserted the uric acid.

CHARACTERS OF URINE DEPOSITING URATE OF AMMONIA.

The following modifications are most important: 1. A pale urine of low specific gravity, becoming opaque in cooling, from the deposition of nearly white urate of ammonia, which forms a rope-like appearance, much resembling mucopus.

2. Urine of moderate density, which is of a pale amber color, and forms, on cooling, a copious fawn-colored deposit (resembling brick-dust dissolved in the urine), but readily disappears by the action of heat. This deposit is very frequent, and in all cases when there is any cutaneous interference.

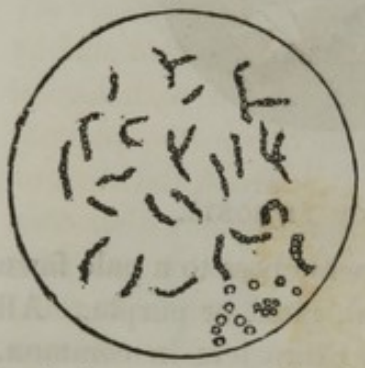
3. If there be any febrile excitement, the urine becomes concentrated, rises in density, and deposits, on cooling, a reddish-brown sediment, constituting the well-known lateritious or brick-dust sediment.

4. In well-marked affections of the portal circulation, especially when connected with organic diseases of the liver or spleen, or when there is a suppurating action going on in the body, and especially of a strumous character, the urine possesses a deep purple or copper color, often verging on crimson, and may be mistaken for blood.

MICROSCOPIC CHARACTER OF URATE OF AMMONIA.

When a drop of urine containing a portion of this substance is put between two pieces of glass, and put under the microscope, a mere amorphous precipitate is seen; but on more careful examination, this will be found to contain myriads of excessively fine globules, adhering together, forming little linear masses (Fig. 126), often mixed with uric acid crystals. Sometimes the urate of ammonia occurs in large globules, mixed with crystals of uric acid. This is observed in albuminous urine (Fig. 127), and, from its opacity, is best observed by reflected light.

Fig. 126.



Urate of ammonia occurs in deposits in delicate needles, sometimes united so as to form stellæ (Fig. 128).

Fig. 127.



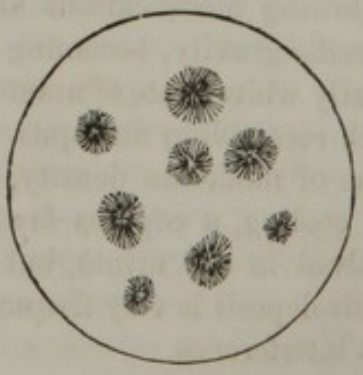
Fig. 128.



Fig. 129.



Fig. 130.



The urate of soda is found in deposits of the urine in cases of gout and febrile affections, and where the treatment consisted in the use of

carbonate of soda. It then is found in round, yellowish opaque masses, provided with projecting and carved processes (Fig. 129), forming a remarkable figure. When artificially prepared, by dissolving uric acid in a hot solution of carbonate of soda, it crystallizes in needles and tufts (Fig. 130). In chemical characters, the urate of soda resembles the salt of ammonia, but does not disappear quite so readily on heating the lime.

PATHOLOGICAL CHANGES IN THE QUANTITY OF URIC ACID AND URATE OF AMMONIA.

Independently of an alteration in the proportion of the uric acid by an excess or deficiency of nitrogen in the food, certain pathological states of the system exert a most important influence on the quantity excreted. Uric acid may be traced to two great sources, the disintegration of tissues and to nitrogenized food. It is obvious, therefore, that whatever increases the rapidity of the former process, or interferes with the due digestion or assimilation of the latter, will materially affect the amount of uric acid contained in the urine. In all diseases attended with great emaciation, when the supply of food is not ample for the body, there will be an increased amount of uric acid in the urine; if the kidneys remain sufficiently healthy to perform their functions. But if the renal functions are themselves affected, as they frequently are, the above would be an exception to the general rule. In inflammatory diseases, in rheumatism, in organic, and sometimes even functional, difficulties, the amount of uric acid will be increased, and the deposit of this substance will appear either free or combined.

In gout and rheumatism there is a great tendency to the formation of an excess of uric acid, both pure and combined, especially with soda. The elements of the acid, or its combinations, are in these diseases supplied by the nitrogenized elements of the food. In such quantities is urate of soda often generated, that the watery portions of the blood are not sufficient for its solution, and part of it is deposited in the joints and sheaths of the tendons, producing painful swellings.

In all diseases attended with excessive debility, independently of acute disease, especially when an anæmic or chlorotic state exists, and when the circulation is languid, or, if excited, is owing to irritation rather than inflammation, a deficiency of uric acid occurs, and no deposit ever takes place in the urine, unless the quantity of water present is remarkably diminished. The diminution of uric acid is well observed after great losses of blood; this may also show how excessive bleeding may develop its effects, and is, in my opinion, one strong evidence against this pernicious practice, which is fast sinking to its proper position in the minds of all liberal members of the profession.—R. S. N.]

When the calculus descends into the ureter, unless of very small size, it requires great local pain, and sympathetic irritation of the abdominal viscera. The patient complains of intense pain in the inguinal region of the affected side, about midway between the superior anterior spinous process of the ilium and the pubis, which is greatly aggravated by pressure or motion. There is incessant nausea, and frequent bilious retching. The stream of urine pressing behind the calculus, and widening the passage, while it forces the obstructed body forward, at length conveys it into the bladder, immediately upon which, all the uneasiness is at once removed. This process of descent, which usually occupies from twelve to forty-eight hours, may be expedited and rendered less painful by administering from time to time doses of castor oil, with the muriate of morphia, or other preparations of opium—by throwing opiate injections into the rectum—by placing the patient in a warm bath—and by bleeding from the arm, if he is of a robust habit. Sooner or later the passage is completed, and there are few preparations more rarely met with in museums than those showing a renal calculus arrested in the ureter.

Having arrived in the bladder, the calculi either remain there or proceed onward through the urethra. In the former case, they become incrusted with layers of various thickness and composition, as has been already explained, and constitute concretions which differ widely, according to the circumstances that attend their formation.

[The following case of urethral calculi, by Professor Freeman, will be of interest in this connection:

Edward George, aged twelve years. When he was born, the physician who officiated on that occasion remarked that he could live only a short time. His countenance had an old expression resembling that of an old man, and though he was a matured child, yet his flesh was so thin over his whole body, that the skin looked wrinkled and laid over in folds. He continued sickly (but apparently not of a scrofulous diathesis) until he was eight years of age. During that time, in addition to other afflictions incident to childhood, he had both rubeola and scarlatina twice.

During his eighth year, he complained of excessive weakness in the loins accompanied with pain in the region of the kidneys, and commenced passing gravel. On one occasion he voided a large calculus which gave him much pain as it passed through the urethra. His appetite was variable, at times very good. He was leeched, etc., for the pain in the bladder, but obtained no relief. Continued laboring under pain and inflammation of the bladder, passing gravel of variable size, some like grains of sand and some larger, also, some pus and purulent mucus, until his tenth year. In August, 1852, a female physician attended him, used the "wet sheet," etc., but still the pain

continued—supposed it was his "ill temper that made him restless."

At this time his appetite was variable—much vomiting—pain in the kidneys, pain in the bladder, and continued spasm of the bladder; it could be felt contracting under the hand. He continually rubbed the pubic region from constant pain.

August 10, 1852.—Was called to see the child in company with Dr. Hewitt—found him very much emaciated, laboring under constant pain, urine scanty, frequent and high colored. Upon sounding the bladder, we detected a calculus.

On the same day in company with the family physician who administered chloroform, we performed the "latteral operation of lithotomy," and extracted an oval calculus about six lines in transverse diameter and dressed the wound in the usual manner, inserting an elastic tube through the incision, and left the patient in the charge of the attending physician. From some cause, the physician found much difficulty in healing the incision. It was four months from the time of the operation, before the urine ceased passing through the wound, and six months before it had entirely closed—it would close and then a small opening of half a line in diameter would present itself, until within three months of the present time.

One day while the attending physician was dressing the wound, she lost a piece of cotton from the end of a probe into the bladder. From the time of the operation to this accident gravel passed with the urine but none afterward, and it was supposed by the parents that the cotton formed a nucleus for the formation of a stone.

From that time forward he suffered severely from pain in the bladder, until within one month of his death, when the pain became excessive. He constantly rubbed his abdomen in the pubic region, and when not under the influence of opium cried incessantly for it. From one ounce to one ounce and a half of laudanum was given him daily at one dose, a less quantity failing to narcotize him. His urine continued to pass unconsciously, keeping the bed clothes moist all the time, until within three days of his death, when he was taken with excessively severe pains in the bladder as though he was attempting to expel some substance. No urine was voided after this, a sero-sanguinous and purulent secretion continually oozed from the meatus urinarius.

Sept. 21.—He died under the influence of laudanum, which he begged for with an irresistible importunity.

Sept. 22.—In company with my brother and a friend of the family, I performed a *post mortem* examination. I found both kidneys one-third larger than their normal size, the left imbeded in a mass of indurated tissue, the ureter enlarged and indurated and also so imbedded

in a mass of indurated adventitious substance that I could scarcely trace it to the bladder. This kidney was much diseased; its internal surface, calyces, infundibula and pelvis of a dark brown color, enlarged and filled with a dark sanguino-purulent secretion. The canal of the urethra was open.

The right kidney was disorganized, presenting a tuberculous and ulcerated appearance, distended with fetid thick grayish pus. The pelvis and one inch of the upper part of the ureter were distended, while at a point one inch from the pelvis the ureter was entirely closed, so that no secretion could pass to the bladder through the right ureter. The remaining portion of the ureter was open.

The bladder was contracted into a small mass about three inches in length, and one and a half inches in width, and close against the pubic bone and empty. The old wound was entirely healed, and the cicatrix presented the usual healthy appearance. In the urethra occupying one-fourth of the anterior extremity of the prostate portion, and all of the membranous portion was a large rough grayish-white oval phosphatic calculus, about one inch and a half in its longitudinal diameter and three-fourths of an inch in its transverse. It was wedged firmly in the urethra and looking as though it had been forced there by muscular contraction of the bladder (which accounts for those severe pains resembling "labor pains," which he had at the time when the urine stopped), and the urethra was stretched tightly, and quite thin over its surface. There was no rupture of the urethra. The remaining portion of the urethra was in a normal condition.

Supposing that the piece of cotton lost in the bladder might have formed a nucleus for the formation of a stone, the parents were desirous to have a post mortem examination, and to see the stone opened. I sawed the stone through the center longitudinally—it was very hard and did not crumble any more than granite. It presented a gray and laminated appearance, with a small nucleus of softer mortar-like substance in the center, but no cotton unless it is in some other part of the calculus. The ill-fortune of this child is seldom equaled. It may be said truly, that "he was born under an unlucky planet." Had means been taken after the operation to change the diathesis of the patient, and prevent those calculus deposits, the case *might* have presented a very different aspect.

There is but little doubt as to the greater frequency of the existence of urethral calculi than the books admit. In my own practice several cases have proven to be such, which were not so suspected to be in the first instance. Indeed, some of them had been in the hands of other physicians, and were discharged as nondescript cases.—R. S. N.]

The symptoms of stone in the bladder are: 1. Pain felt in making water, especially when the last drops are expelled, and for some time

afterward, which is referred chiefly to the point of the penis; but also to more distant parts, as the inner side of the thighs, testicles, particularly the left one, and even the feet. 2. Uneasy feelings of a similar kind, but not so intense, experienced upon any sudden motion of the body. 3. Frequent desire to make water, varying in degree from slight diminution of the length of the intervals, to almost incessant calls which it is impossible to resist. 4. The urine being tinged with blood after rough motion. 5. An occasional interruption of the stream of urine. 6. A peculiar expression of suffering and anxiety in the patient's countenance. These symptoms vary extremely in their positive and relative severity, being always most intense when there is irritation of the bladder or general system, and bearing a direct proportion to the degree in which the urinary secretion is deranged; a fact not easily explained, but very important in respect to the treatment of the disease. Thus, contrary to what might be expected, the least annoyance attends the mulberry calculus. The uric acid kind are accompanied with more, and the phosphates with most of all. As there are other diseased states of the urinary organs which give rise to complaints more or less similar to stone in the bladder, it is necessary for obtaining certain proof of its existence to introduce an instrument into the bladder, and search it. The operation performed with this view is named Sounding, and is executed by means of metallic instruments variously formed. The one that will generally be found most convenient is a steel bougie of the size usually rated No. 3, or 4. It should be moved about methodically into every part of the bladder, while the patient lies reclining. If the point grazes against the rugæ of a thickened muscular coat, an inexperienced surgeon may be misled into supposing that there is a stone; but if it really encounters one, there will hardly be a possibility of misinterpreting the distinct sensation which is always felt, and the corresponding sound generally heard at the same time. A small stone may escape detection, from the bladder being too much distended or too much collapsed; and when either of these sources of fallacy is suspected, a catheter should be introduced to draw off the water, or convey in a sufficient quantity from a syringe or elastic bag. If the parts about the neck of the bladder are very irritable, and grasp the sounding instrument tightly, soothing measures, such as gentle evacuation of the bowels by castor oil, opiate injections into the rectum, and the warm-bath, ought to be employed. When the prostate has suffered enlargement, a sort of pouch is generally formed behind it, in which the stone may lie so as to be hardly tangible by the sound, unless placed more within its reach, by altering the position of the patient, or elevating the bladder by a finger introduced into the rectum.

The treatment of stone in the bladder may be divided into palli-

ative and radical. The former consists in the use of means which tend to prevent the concretion from increasing, and to alleviate the patient's sufferings; the latter, by removing the calculus, affords effectual relief from all the uneasiness of the disease.

The means used with a palliative view are such as may be expected to correct derangement of the urinary secretion, and thus not only remove that excess of acid, or saline constituents, which is essential for the occurrence of concretion, but also diminish the severity of the symptoms resulting from the calculus actually existing, since these, as has been already observed, always correspond directly in their severity with the degree to which the secretion of urine is morbidly altered. In order to determine what remedies ought to be prescribed for this purpose, the urine of the patient must be examined. If it shows the characters which denote an excess of acid, alkaline medicines will be indicated. Of these the carbonates of soda and potash are the best, and may be administered in the dose of a scruple or half a drachm, two or three times a day, dissolved in a tumbler of water. Should the patient suffer from heartburn, or other symptoms of acidity in the stomach, he ought to take occasionally a teaspoonful of calcined magnesia. Lime-water and soap ley were formerly much used in various forms and combinations, in the expectation of their producing a solvent effect on the stone; and the relief experienced from them was often so great as to afford apparently good ground for believing that they possessed such a power. It is admitted now that they could act beneficially only by correcting morbid derangements of the urinary secretion; and they are, therefore, superseded by the less nauseous alkaline preparations above-mentioned. If, on the contrary, the quantity of earthy and alkaline salts seems to be redundant, acids should be employed. The muriatic is usually preferred, and may be given in the dose of twenty or thirty drops, in a sufficient quantity of water, three times a day. When, along with this state of the urine, there exists much irritation about the bladder and kidneys, as is generally the case, small doses of opium ought to be conjoined with the acid; and other means of a soothing kind, as the hip-bath and opiate injections, at the same time prescribed. Whatever be the nature of the derangement, it will always be proper to correct any errors in the patient's diet or mode of living that tend to injure the health in general, and the digestive functions in particular.

The means which are employed, with the view of effecting a radical cure, may be considered under three heads, accordingly as they act: 1. By promoting the escape of a stone entirely through the natural passage; 2. By breaking down the stone into fragments small enough for being carried out with the stream of urine; and, 3. By cutting a free outlet for the stone.

Renal calculi of small size generally remain only a short time in the bladder, and pass out with the urine often almost immediately after descending from the ureter. When the history of the case leads to the suspicion of there being a concretion of this kind remaining in the bladder, or if it should be detected by sounding, its exit ought to be assisted by a very complete dilatation of the urethra by means of bougies, by drinking copiously of simple diluent fluids, and by the relaxing influence of warm bathing. Sir A. Cooper recommended the use of forceps, shaped like a sound, for seizing and extracting small calculi.* If there are many concretions, the instrument contrived for this purpose, at Sir Astley's suggestion, by Mr. Weiss, may be used with safety and advantage; but if there be only one, the groping that will generally be required for its seizure can hardly fail of being very injurious. Prosper Alpinus relates, that there was a practice in Egypt, of ancient origin and extensive employment, for the removal of stones from the bladder, which consisted in distending the urethra by blowing into it with a tube, and then urging the calculus to descend by pressing on it with the fingers introduced into the rectum. It is difficult to conceive the possibility of executing this procedure on an adult, and in children the urethra is too narrow for allowing much advantage to be derived from it. Cases sometimes occur in which the calculus has entered into the urethra, and after passing through more or less of its extent, has been arrested at a narrow part of the canal, either natural, or resulting from stricture. The membranous portion is the most common seat of this occurrence, which also happens sometimes at the orifice. A retention of urine occasionally results from the obstruction thus caused; and, if a full-sized catheter were passed without any precaution, it might push the concretion back into the bladder, which of course ought to be avoided. The instrument should be merely carried down so far as to disengage the calculus from the contracted place that it occupies, and which it closes like a spherical valve—or, if of a very small size, it may be conveyed past the concretion into the bladder. The immediate bad effects being thus obviated, it is necessary to employ means for assisting the stone to pass forward. Bougies of progressively increasing size, introduced down to the seat of obstruction, may prove sufficient for this purpose. Forceps are used with hardly any advantage, from the difficulty of expanding their blades. When it proves impossible to extract the calculus from the urethra, it ought to be cut out, which is readily effected, by making an incision upon it while held firmly, so as to prevent any displacement during the operation, or upon a grooved staff. The wound sometimes heals by the first intention, but it is prudent to keep a

* Med. Chir. Trans., Vol. xi.

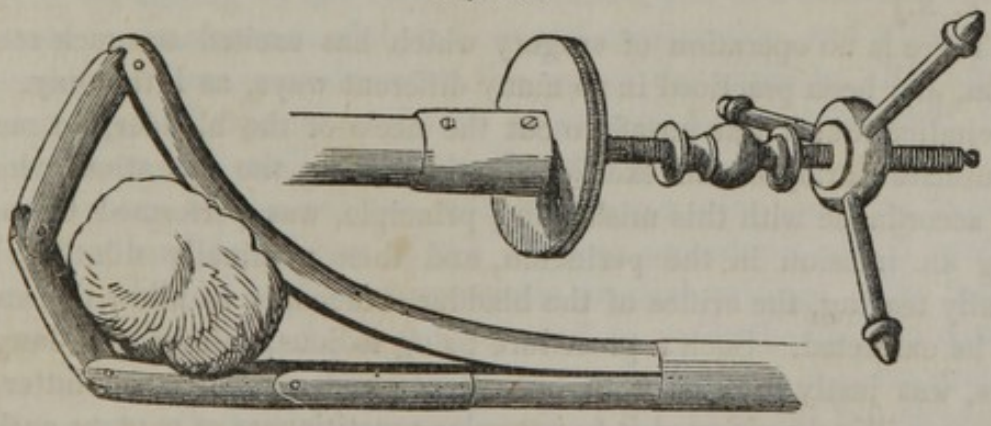
flexible catheter in the urethra for a few days, to prevent any risk of the urine infiltrating into the cellular substance. Calculi are sometimes lodged in fistulas of the perineum, and, of course, so long as they are permitted to remain, render a cure by the ordinary means impracticable. If discovered in this situation, they should be removed without delay by incision.

The second mode of removing a stone from the bladder consists in grinding it down to powder, or pieces small enough for escaping by the natural passage. Though there are very ancient traces of this practice, and though in modern times ingenious patients have occasionally, by persevering efforts, succeeded in bringing away part, if not the whole, of calculi from which they suffered, yet Lithotrity, as this method of operating has been named, may be regarded as of very recent origin. The apparatus was necessarily very inefficient and unmanageable so long as the canula through which it was introduced into the bladder had a curved form. Some anatomists of the last century suggested that a straight instrument might be passed along the urethra; but Dr. Gruithuisen (1813) first used a straight catheter. The contrivance of this gentleman, followed by the successive improvements of Amussat, Leroy, Civiale, and Heurteloup, rendered the lithotritic apparatus wonderfully perfect. It consisted of a straight canula, containing another of steel, the extremity of which was cleft into three branches, that expanded by their own elasticity when pushed beyond the external tube, and closed upon being drawn within it. This internal canula in its turn inclosed a solid rod of steel, terminating in a head so figured as to act destructively on a stone submitted to its rotary motion. At the other extremity of this apparatus there were additional parts for preventing the escape of the urine, without impeding the motion of the canulas or perforator, and for attaching the string of a drill bow. When the stone was large, a compound perforator could be employed, having a movable branch at its extremity, that might be separated to more or less distance from the central position by a regulating screw at the other end, and excavate the stone to an extent corresponding with the degree of its expansion. The thin shell thus formed was broken by another instrument, named *brise-coque*, which consisted of an instrument shaped like a slightly curved sound, and having its extremity formed into strong jaws, which were made to separate and embrace the stone, which was then crushed by the blows of a hammer or the force of a screw. The latter apparatus has come to supersede the former one for the whole operation, which is, therefore, now named Lithontripsy or crushing, to distinguish it from the grinding process. It is needless to describe particularly the various instruments employed, since description alone could give no precise idea of their structure, and still less of their exercise. The gen-

eral principle, as already mentioned, consists in the separation of the jaws by pushing one before the other, and then, after grasping the stone, approximating them by the force of a screw or simply manual pressure.

When the operation is to be performed, the patient should be placed reclining, with his shoulders supported on a table, constructed for the purpose, so as to admit of the patient's body and pelvis being nicely adjusted in position. The bladder being moderately distended with urine, or water injected into it, a sound is passed to ascertain the precise position of the stone; the surgeon then introduces the apparatus, and expanding the branches when fairly in the bladder, seizes the calculus, and exercises the requisite compression for breaking it. The complexity of the instruments, and the circumstances in which they are used, render the process extremely difficult, while the bad consequences of its inexpert performance are of the most serious nature. It will, probably, therefore, never be practiced with advantage, except by those who devote a large share of their attention to its performance; and even in such hands there is reason to fear, that though perhaps in some cases successful, and seldom immediately fatal, it may not unfrequently be productive of the most mischievous effects. Chronic inflammation of the prostate gland or mucous membrane, if excited by the pressure or laceration of the instrument, will probably lead to farther derangement of the urinary secretion, and the consequent deposit of new calculi—the irritation caused in extracting which, will keep up the train of morbid action, and if not at length fatal to the patient, must at all events make him suffer much more than he would have done from excision of the stone.

Fig. 131.



[I here introduce to the profession the lithontriptor of Max Wocher, together with the mode of using it. The patient is placed on a table covered with quilts; the hips are elevated so as to throw the stone back from the mouth of the urethra, and the bladder, if not already full of urine, is to be nearly filled with tepid water, injected through

a catheter. The urethra must have been previously dilated by the repeated use of bougies, increasing the size, from time to time, for a week or more, until the *lithontriptor* will enter. This instrument (Fig. 131) is then warmed, oiled, and passed in, closed up, as a common sound or bougie. When it comes in contact with the stone, the movable half is pushed in so as to open the blades at the joints, and form a sort of firm loop or noose. Rotate this from side to side, and tighten a little occasionally, so as to grasp the stone whenever it gets into the loop. As soon as it is fixed between the blades, as represented in the above drawing, which will be known by your inability to draw the sliding half back, turn gradually upon the arms of the screw, which slowly, but with great force, draws out the slide, and brings the blades together. When the stone gives way, and the instrument closes, reopen it and maneuver as before to catch any large fragments that may remain; continue this until all are finely crushed; then withdraw the instrument, and let the patient turn over, with his face downward, and evacuate the fluid from the bladder as freely and rapidly as possible: it will carry off with it a large portion of the powdered stone. If the urethra and bladder are not too irritable, inject the bladder full of tepid water immediately, and let it pass off. This may be several times repeated, if the patient can bear it, until all the fragments are passed away. If there be too much irritability in the parts for these injections, you must depend on the natural evacuations. These, however, may be much aided by the free use of demulcent diuretics, such as an infusion of althæa officinalis, eupatorium perpureum and juniper berries, equal parts, drank to the extent of two or three pints a day.* It is seldom, however, that the operation of lithontripsy is available, and hence the necessity for the operation of lithotomy.—R. S. N.]

There is no operation of surgery which has excited so much attention, and been practiced in so many different ways, as Lithotomy. A prejudice that it was unsafe to cut the neck of the bladder, for many centuries paralyzed all exertions in improving the operation, which, in accordance with this misleading principle, was performed by making an incision in the perineum, and then nominally dilating, but really tearing, the orifice of the bladder sufficiently to allow the stone to be extracted. Such a procedure being tedious, painful, and dangerous, was justly dreaded both by patients and surgeons, the latter of whom willingly resigned it to irregular practitioners of rupture curing, and cutting for the stone, who in those days traveled the country in search of employment. The mode of performing lithotomy was indeed taught in the schools, and ingenious men contrived various modifications

* Eclectic Surgery.

of the apparatus; but no real improvement was effected until near the end of the seventeenth century, when Frere Jacques introduced an entirely different method, which was to cut freely into the bladder. He commenced his career as a lithotomist, unacquainted with anatomy, and provided with very imperfect instruments—but nevertheless extracted the stone with such invariable facility and dispatch, that though many of his patients died, and comparatively very few made complete recoveries, he acquired great reputation, and the friendship of some of the most distinguished surgeons in Paris. Through their assistance he supplied the defects of his education, and afterward operated in various countries with distinguished success. The important truth having thus been ascertained, that the bladder could be cut without any fatal or injurious consequences, the attention of surgeons took a different direction, and a variety of methods and instruments were contrived for cutting the same parts that had been previously torn. It is unnecessary to consider these particularly, as the operation practiced and described by Cheselden (1720), though, perhaps, not differing materially from that of some other surgeons, both in this country and abroad, has been generally regarded the standard for imitation.

The lateral operation of Cheselden consists in making a free incision of the perineum—opening the urethra at its membranous part—and continuing the cut through the prostate gland, obliquely outward and downward. The simplest mode of effecting this is to use a scalpel, or other knife, that may be under the surgeon's command; but as it requires an accurate acquaintance with the relative situation of the parts concerned, and considerable manual dexterity, to divide the prostate safely with such an instrument, various apparatus have been contrived for cutting in the requisite direction, and to a sufficient extent, merely in consequence of their form and construction, and without the necessity of precise guidance on the part of the surgeon. But after a hundred years' experience of such substitutes for operative skill, it is now almost universally admitted that the simple knife is by far the safest means for the purpose, and it does not seem necessary to enter here into any description of the obsolete procedures which used to occupy so large a portion of systematic surgical writings. The instruments required are: 1. A grooved staff to guide the knife in cutting into the bladder. It ought to be of the largest size that the urethra will readily admit, which is usually about No. 11 of the bougie scale,* and the groove should be very wide and deep, neither on the side nor convex surface, but in the intermediate space, so as to correspond with the direction in which the incision is carried. Mr. Aston Key has

* Equal to No. 14 of the scale generally used in London.

recommended a straight staff—which certainly has the advantage of conveying the knife more directly than a curved one, but is liable to the objection of occupying the operator's left hand, while the section is made, instead of leaving it at liberty to press aside the rectum, and ascertain when the incision has been carried far enough. In children, where the prostate is easily divided, and where, from the necessarily small size of the instrument that is introduced, the difficulty attending a curved direction of the groove is greatest, the staff may be preferable. 2. A knife, which, including both the handle and blade, should be between seven and eight inches in length. The blade ought to have its cutting part at least two inches long, not very broad, and sharp enough at the point to permit its being pushed through the skin and other parts. 3. Forceps for extracting the stone, of two or three different sizes, of which the blades should be broad, moderately hollowed, and destitute of projecting teeth, which are apt to break the calculus. 4. A scoop to remove fragments or gravel. And, 5. A flexible tube, about six inches long, and half an inch wide, to convey away the urine after the operation, and prevent its infiltration into the cellular substance.

The parts that require to be cut are: 1. The integuments, which should be divided to the extent of about three inches in an adult, or more if the subcutaneous adipose tissue is unusually thick, and of course less in children. The incision should extend obliquely from the raphe of the perineum to the hip, passing nearly equidistant between the anus and tuberosity of the ischium. 2. The transverse muscle of the perineum, and anterior part of the *levator ani*. 3. The transverse artery of the perineum. 4. The membranous part of the urethra. 5. The prostate gland through the whole extent of its left lateral lobe. And the parts which ought not to be cut are: 1. The rectum, which may be injured in laying open the perineum, in cutting into the groove of the staff, and in dividing the prostate, but chiefly in enlarging the wound, in case it proves too small, subsequently to withdrawing the staff. 2. The artery of the bulb of the urethra, and the bulb itself, from cutting into the canal too far forward, and at its lateral part. 3. The pudic artery, from cutting too much in a lateral direction in making the section of the prostate. 4. The internal fascia of the perineum, or vesical reflexion of the pelvic fascia, from cutting the prostate upward, or carrying the incision beyond it in a lateral direction.

When the operation is to be performed, the patient should have his bowels freely evacuated by a laxative administered the day before. He should be placed reclining on a table about two feet and a half high, covered with a folded blanket, and under the head a pillow or two may be laid, but nothing to raise the shoulders. He is then to seize the soles of his feet, one in each hand, which should rest on the

fibular or outer edge, and by means of a strong tape or bandage have the limbs secured in this position, after which they are to be confided to two assistants, one standing on each side of the table. The staff having been introduced, is now to be committed to a third assistant, who holds it up in one hand, and the scrotum in the other. The surgeon then seats himself on a chair, shaves off the hair from the perineum, feels the different parts that determine the place of his incision, and resting the fingers of his left hand on the skin so as to prevent any displacement of it, pushes his knife directly inward at the anterior point of incision, to the depth of the perineal muscles.

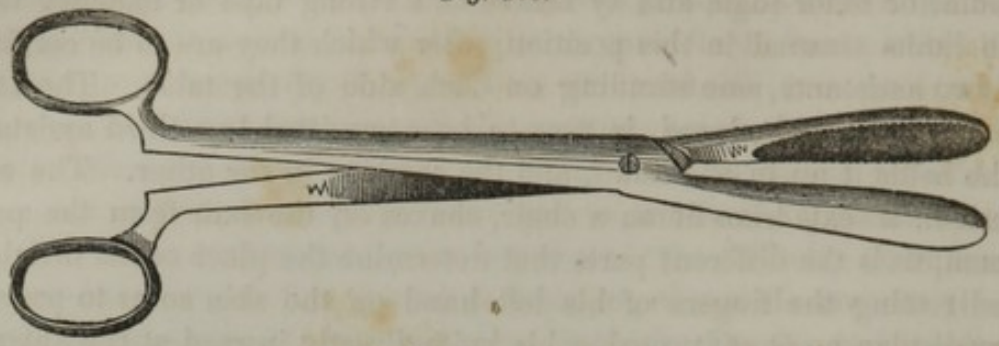
Fig. 132.



He cuts in the direction above mentioned so as to divide the skin, fat, superficial fascia, and transverse muscle, gradually diminishing the depth of his incision until it reaches its posterior termination; then introducing the fore-finger of the left hand into the center of the woung, to serve as a guide for the knife and protection to the rectum, he cuts from this point upward and downward so as to divide the anterior part of the *levator ani*, and expose the membranous portion of the urethra, into which he makes an opening, and then, keeping the knife in the groove, while he satisfies himself, by taking the staff in his left hand, that it is held properly in the mesial plane close up against the pubis, he gives it again to the assistant, and pushes the knife steadily into the bladder, and fairly through the prostate; at the same time, with his left hand, holding down the rectum, and feeling what way is made with the knife. He then introduces his finger into the bladder, desires the staff to be withdrawn, and conducts in the forceps.

He searches for the stone with the blades closed, and, having found it, opens them very wide, depresses, and them closes them. By gently

Fig. 133.



relaxing his hold, and renewing it, he shifts the position of the calculus, if unfavorable for extraction, and, with the assistance of his left fore-finger, proceeds to draw out the stone, not directly, but by a motion in alternate directions, so as to dilate the margin of the wound without tearing. Forcible efforts ought never to be used in doing this; and it is much better to introduce the knife again, if the opening proves too small. After one stone has been removed, the bladder ought to be searched for more, with a sound introduced through the wound; and if any are detected, they must be removed in the same way as the first. Should the calculus be broken, its fragments must be carefully extracted with the scoop if small, or the forceps if large. The tube is then to be introduced, either alone, or, if there is much tendency to hemorrhage, with some folds of lint wrapped round its middle, after which the patient may be placed in bed, on his right side, with the limbs moderately bent.

The after treatment in cases that proceed favorably is extremely simple. Means must be employed to prevent the urine which distils through the tube from soaking the bed, by interposing a piece of oiled cloth between the breech, and a folded blanket laid under it, and applying tow or sponge at the orifice to imbibe the fluid. The diet, during the first three or four days, should be sparing, and of a farinaceous kind. Gentle laxatives, such as castor oil, are to be administered, as occasion may require. The tube may be withdrawn at the end of two or three days. About the ninth day a little urine is generally observed to issue from the urethra; and when the natural passage thus begins to be resumed, the discharge by the wound very soon ceases, so that by the thirteenth or fifteenth day the whole is evacuated by the penis.

The bad consequences of the operation are: 1. Sinking; 2. Hemorrhage; 3. Infiltration of urine; 4. Inflammation at the neck of the bladder; 5. Peritonitis; 6. Recto-vesical fistula.

Unless the patient is extremely weak from the exhaustion of disease, or the feebleness of his age, as when it is below two, or beyond seventy years, there is no risk of his sinking directly under the effects of the irritation attending the operation, if properly performed. But if,

from the inadequate size of the wound in the bladder or *levator ani*, the stone, instead of being gently extracted, is dragged out by force, after long and painful ineffectual attempts to draw it through, the stoutest individual may suffer a shock too great for his strength, and die in the course of a few hours, as if suffering from profuse hemorrhage, an extensive burn, or any other injury destructive to the powers of life.

If the vessels are regularly distributed, and the surgeon cuts no more than he ought to do, there is hardly any fear of a fatal or even troublesome bleeding. Should the dorsal artery of the penis rise from the pudic high in the pelvis, and take the course which it has been observed to follow in some few cases along the neck of the bladder, and obliquely across the lateral lobe of the prostate, it can hardly escape division during the performance of the operation which has been described. The coincidence of such an irregularity with stone in the bladder must be extremely rare; and the danger of hemorrhage from this source so small as to afford little reason for apprehension, though instances of it have occurred. When the flow of blood appears alarming, the surgeon should introduce his finger into the wound, and press the pudic against the ramus of the ischium. He will then ascertain whether the hemorrhage proceeds from it or its branches given off below, in either of which cases a ligature may be applied by means of a tenaculum, the sides of the wound being held aside, and the source of the bleeding, if necessary, exposed to view more completely by farther incisions. If the hemorrhage is found to proceed, not from the trunk of the pudic, the artery of the bulb, or that of the perineum, it must be referred to the neighborhood of the prostate, and all that can be done is to introduce a tube wrapped in lint, raise the patient's breech, and apply cold.

Infiltration of urine takes place when, from the small size of the wound, from its being seated too far forward in the perineum, from an insufficient division of the *levator ani*, or from swelling of the cut surfaces, the urine has not a free outlet externally; and if the incision of the bladder is carried far back, more especially through the reflection of the pelvic fascia on its neck, this untoward event will be more apt to happen. The patient feels first a painful sense of distension, and then an uneasiness in the hypogastric region behind the pubis, which leads to the belief that peritonitis is commencing, and blood is freely withdrawn, both locally and generally, without affording any relief. A fever, attended with the symptoms that denote excessive irritation, commences, continues in despite of every means employed to check it, and proves fatal in a few days. Whenever the urine is not observed within five or six hours after the operation, the surgeon should examine the tube to discover whether or no it is obstructed by

coagulated blood; and if a tube has not been employed, he should introduce his finger into the bladder, so as to make sure of there being a free passage for the fluid, keeping in mind that infiltration of urine, though in general easily prevented, can seldom, if ever, be remedied.

Inflammation at the neck of the bladder is one of the bad consequences most to be dreaded. It is attended with incessant pain at the point of the penis, insufferable nausea, with disgust at every sort of food, and occasional retching, yellow-furred tongue, frequent pulse, and great general restlessness. It proves fatal seldom sooner than one or later than three weeks. On dissection, the cellular substance at the neck of the bladder is found infiltrated with pus, and the prostate gland also contains purulent collections. The circumstances that seem to have most effect in giving rise to this insidious and deadly process, are laceration and contusion inflicted during the removal of the stone, especially if it is of large size, and the prostate is previously in a diseased state of enlargement. Little can be done to arrest the inflammation when once excited; but the means that promise most assistance in doing so, are frequent immersion of the pelvis in a hip-bath, opiate injections, and moderate depletion.

Peritonitis very seldom follows the lateral operation of lithotomy; but if it should occur, it will appear within twenty-four or forty-eight hours at farthest, and may be recognized by the tenderness of the abdomen to pressure, the small wiry pulse, and cadaverous appearance of the patient. Free depletion, both local and general, warm fomentations, and the warm-bath, will be the proper remedies.

A communication between the rectum and wound occasions, in the first instance, little inconvenience; but as the cure advances, and the orifice of the wound contracts, the contents of the gut, whether gaseous or liquid, instead of escaping through it, are forced into the urethra, and issue from the penis, while part of the urine descends into the rectum. The remedy for this disagreeable occurrence is to divide the septum that lies between the external orifice of the wound and its communication with the gut; but this should not be done immediately after the operation, as it has often happened that the wound of the intestine occasioned no trouble, and healed by the first intention.

When the various obstacles to success that have been mentioned, together with the adverse influence of disease in the kidney, which is sometimes associated with stone in the bladder, and also the dangerous consequences common to all severe operations, are taken into account, it will appear obvious, that, however perfect the principles on which the operation is performed, and skillful its execution, the patient's recovery cannot be regarded as by any means certain. A succession of fortunate cases often leads an operator to flatter himself with a belief

of his own infallibility, but sooner or later he meets with reverses; and it appears that the average of successful practice is one death in from seven to ten cases. The period of life at which the operation proves most successful, is between the second and fifteenth years, and next to this from sixty to seventy. The most unfavorable age seems to be about forty or fifty; and it is always observed that when the health is vigorous, and the suffering from the disease slight, the risk is much greater than when the patient is reduced by continued and incessant pain, provided no organic disease has been excited in any part of the system.

[There has been a vast amount of suffering in consequence of the formation of calculi in the kidneys and bladder. Many men suffer with stone through a long life, and never imagine the nature of their disease. It is not uncommon to find such calculous deposits in subjects for dissection. Men are not alone the subjects of the disease, as we sometimes find stone in the bladders of horses, hogs, etc. I have now in my possession a large calculus taken from the bladder of a hog, precisely similar to some that have been taken from the human subject. Surgery accomplished much when it acquired the principles and practice of lithotomy; and though few surgeons have practiced it to any very great extent, yet all competent surgeons are now ready to undertake the feat, which, though one requiring great skill, may be performed with safety by a judicious operator.

There are various plans of operating, none of which have proven to be more successful than the lateral operation of Cheselden. This, however, will depend very much upon the character of the particular case. No operation in surgery has excited more attention from the profession than that of lithotomy. In this country perhaps no surgeon has had better success than the elder Dudley.

Without here inquiring into the nature of the causes which favor the formation of stone, I may remark that it is seldom found in children who have been abundantly supplied with the necessaries of life, and much less often in the poor than in the rich. It would seem that certain constitutions are more liable to the disease than others, the most favorable one being the scrofulous.

To facilitate the operation, all the inventive skill of the profession has been taxed in producing the best instruments, none of which, for the lateral operation, are equal to the ordinary gorget of M. Roux. Having examined the bladder with a metallic sound to assure us of the existence of a stone, and determined upon the necessity of an operation, it will be necessary to prepare the system for the shock consequent upon the operation, which may require several weeks, unless the symptoms are urgent for an immediate operation.

The next question for the consideration of the surgeon, will be to

determine which of the common plans of operating he will adopt, there being several, as the lateral, the bi-lateral, the recto-vesical, and the high operation above the pubis. The first and the last are the simplest plans, though the bi-lateral and recto-vesical may each be sometimes preferable. The high operation is exceedingly simple, but there is great danger of urinary infiltration, which always proves fatal when it occurs, and hence surgeons prefer the lateral operation, which is regarded as safer especially by American operators.

To perform this operation with success, one must have an intimate knowledge of the anatomy of the parts, and even then there may be such a displacement of the arteries of the part through which the incision is to be made, as to cause extensive hemorrhage, under which the patient may rapidly sink. So, too, if the operation be bunglingly performed, there may be urinary infiltration or excessive inflammation.

I will illustrate the subject by an operation which I very recently performed in Newton's Clinical Institute.

Joshua Mason, of Clifton, Tennessee, was sent to me by his friends, who could find no one in his neighborhood to perform the operation on him. When he arrived he was in a very weak and emaciated state, and as his symptoms were not extremely urgent, I thought it best to put him under preparatory treatment.

Mr. Mason furnished the following account of himself: He was forty-seven years of age, and had been laboring under calculous disease since he was twelve years of age. He said he was a very poor man, with a family of six children, from which we may readily suppose that he had labored under some privations. When about twelve years of age, he passed a stone as large as the end of his finger, which had lodged in the urethra a day or more, and gave him much pain. Since that time he had labored under constant pain in his back and hips, and it appeared to him that one of his kidneys was frequently swollen as large as his fist, and exceedingly painful when pressed. His urine had always deposited a heavy sediment, though, as he was so very poor, he had sought no medical aid until 1852, when Dr. W. Hunter, of Clifton, examined him. Not receiving the alleviation he had sought, he called in Dr. Wolfe, of the same place, who recommended him to come to me for an operation. His friends finally raised him money enough to pay his traveling expenses to and from the city, and trusting to circumstances, he had come to the Clinic for treatment. He said that he had lost an uncle by cancer, and another by scrofula. He had been a temperate man, and those who had prescribed for him gave him nothing but copaiba and niter.

On the 9th of December, 1856, he was placed on the operating table before the class of the Eclectic Medical Institute. Being ætherized, I immediately proceeded to operate, removing the stone and exhibiting

it to the class in four and three-fourth minutes from the first incision. The stone was about one and a half inches in the long diameter, and a solid oxalate of lime mass. After dressing the wound he was removed to his ward, and at the end of twenty-one days, was again presented to the class, perfectly cured, and was discharged. There was scarcely any hemorrhage, and though a restless and stubborn patient, he has been enabled to return to his family in a much better condition than he has been in for many years.

The whole secret of success in these operations is a perfect knowledge of the parts and of the minutia of the operation. Of course, there are cases in which the best of surgeons will fail, but I am satisfied that when both surgeon and patient are governed by proper care the large majority of patients will recover.

It is in these severe operations that the benefits of chloroform are so apparent. It is quite as easy now to operate on the living as on the dead subject, since the person is reduced to a state of perfect unconsciousness, and, of course, there is no cringing under the strokes of the knife. The patient sleeps, as it were, under the most terrible operations, and awakes to find himself relieved from his ills; not a moan escapes him, not a pain racks his body, not a thought of fear crosses his mind.—R. S. N.]

Other methods of cutting for the stone have been proposed and followed more or less extensively; but as the success attending any of them has not nearly approached that of the operation which has been fully considered, it seems unnecessary to enter into a particular detail of them, and the three following may be noticed shortly as the most deserving of attention: 1. The bi-lateral operation; 2. The high operation, or above the pubis; and 3. The recto-vesical operation.

The first of these was contrived by M. Dupuytren, in order to lessen the risk of injuring the rectum and pudic artery. The peculiarity of it consists in cutting the prostate on both sides equally, which is effected by an instrument constructed for the purpose, and composed of a sheath containing two blades, that can be made to project laterally more or less as may be required. This instrument, being conveyed into the bladder on the groove of the staff, after the preliminary incisions have been made in the perineum, in a transverse direction, is expanded and withdrawn in this state, cutting the gland to the requisite extent. Many objections might be urged against this method, but it is sufficient to mention that the result of experience is not in its favor. The high operation is of older date, having been introduced about the close of the seventeenth century, when it was discovered that the bladder could be cut with safety; but the proper principles for operating in the lateral way had not yet been established. It was proposed considerably earlier than this, and had even been practiced in

some few cases, but did not engage much attention until the time mentioned. The mode of procedure was to make an incision in the *linea alba*, about three inches long, extending from the pubis upward, separate the recti muscles, and open the anterior or pubic side of the bladder, beginning as near as possible to its neck, and continuing the wound upward to a sufficient extent, with care to avoid cutting the peritoneum, where reflected on the fundus. The advantages contended for in recommendation of this operation, were the facility of its performance, even where the stone was of the largest size, the safety of it in respect to hemorrhage, and the comparatively small degree of pain it occasioned the patient. The objection, however, of urinous infiltration, which was equally obvious in theory and serious in practice, more than counterbalanced these arguments; and the means contrived for preventing this dangerous consequence either proved insufficient, or, by their complexity and irritation, destroyed the great ground of superiority contended for. The high operation is now performed by very few surgeons, and will probably soon cease to be practiced at all. The recto-vesical method was introduced by Vacca and Sanson (1816), and through the influence of their recommendation, together with that of some other surgeons, attracted considerable attention for a few years. It consisted in dividing the *sphincter ani*, rectum, membranous part of the urethra and prostate, so as to lay the two canals thus far into one, through which the stone could be easily extracted. This was effected by introducing into the bladder a staff grooved on its convex side, cutting through the sphincter and the integuments of the perineum, and then conveying in a sharp-pointed curved bistoury, which being entered into the groove beyond the prostate, and carried steadily forward, completed the cutting part of the operation at once. It was contended that the stone could thus be got out very easily, and with hardly more pain than what attends the operation for *fistula in ano;* that there could be no danger of bleeding incurred; and that the risk of urinous infiltration, as well as inflammation, would be less than after the lateral operation. The great objection that obviously suggested itself was the probability of a recto-vesical fistula; but the free division of the sphincter seemed likely to diminish the chance of this, and experience proved that it did not often happen. In the hands of an inexpert operator, this method is perhaps the least difficult; but it certainly must be regarded as decidedly inferior to the lateral operation, when properly performed, as well in regard to the danger of its immediate effects, as in prospect of the patient's condition after recovery being accomplished.

[In theory, the high operation is certainly the most simple; but, as Mr. Syme suggests, the dangers attending it are so great, that hardly any surgeon would now consider himself justified in adopting it.

Since the discovery and introduction of chloroform, it might be attempted with more plausibility than at an earlier date; yet, in any event, the lateral operation is so very superior, that I should rarely or never think of adopting it.—R. S. N.]

RETENTION OF URINE IN FEMALES.

From the shortness, straight direction, and width of the urethra, together with the absence of a prostate gland, females are much less liable to retention of urine than males. They suffer from it, however, occasionally, in consequence of the following circumstances: 1. Paralysis from distension; 2. The pressure of a gravid uterus; and 3. Retroversion of the uterus.

The female bladder is more capacious than that of the male, and can suffer the accumulation of more fluid without being injured in its contractile power.

When, however, the limit of healthy expansion is at length exceeded, the same effect is induced as when the male bladder is concerned, and the patient labors under a complete retention, and requires for her relief that the catheter should be introduced. The instrument employed for the purpose is made of silver, about six inches long, very slightly curved, and a quarter of an inch wide. The patient lies in bed on her back with the thighs drawn up; and the operation ought to be performed under the clothes. The forefinger of the right or left hand, according to the position of the patient, is introduced between the *labia minora*, and carried upward to their junction, a little below which the orifice of the urethra is situated, and where it is readily recognized by the feeling of a depression, with a little elevation behind or nearer the vagina. The finger being retained here, the point of the catheter is by its means properly directed, and may then be easily pushed into the bladder. The mouth of the tube may be closed by applying the thumb over it, until a receptacle is provided for the urine, or a bladder may be tied to it so as to secure the fluid, without any risk of allowing its being spilt upon the clothes. If the catheter has a stop-cock upon it this will be managed still more conveniently, but the instrument is thus rendered rather too complicated for its easy introduction.

When the uterus is distended, and more especially when its contents descend low in the pelvis during parturition, the urethra is liable to such compression and displacement, as frequently induce retention of urine. In such circumstances, it is not always practicable to introduce the common female catheter, and one either flexible, or, if rigid, curved like that for the male urethra is required. The difficulty is still greater when the retention depends upon retroversion of the uterus. This displacement consists in a turning back of the fundus of the

uterus, and its being bent down between the vagina and rectum. It very rarely occurs in the unimpregnated state, though it is said to have been met with in virgins, and is most apt to happen between the third and fourth months of pregnancy, in consequence of some sudden motion of the trunk, as in leaping or dancing. A consideration of the relative situation and connection of the *os uteri* and urethra will render it obvious that the effect of such a retroversion on the latter must be a great extension of it upward and forward; withdrawing the orifice from its usual situation; impeding the discharge of the urine, and rendering the introduction of a catheter extremely difficult. The bladder becoming distended, reacts on the primary disease, and opposes the replacement of the uterus, whence the first object in the treatment is to draw off its contents. This may sometimes be done by means of a flexible, or curved silver catheter; but it has happened repeatedly, that such instruments could not be introduced, and the patient either died from extravasation of urine, or was saved by puncture of the bladder above the pubis. Should that operation be judged necessary, it is to be performed in the same way as in the male; but especial care must be taken in introducing the trocar, not to transfix the elongated and narrowed neck of the bladder, which may happen by directing the instrument perpendicularly, instead of backward toward the promontory of the sacrum. The uterus also has been punctured from the rectum; but this proceeding must be regarded as unwarrantable, unless the other more safe measures have been tried without success. When the resistance of the distended bladder has been removed, the surgeon should introduce the fore and middle fingers of one hand into the rectum, while the other co-operates in the vagina, and endeavor to replace the retroverted uterus.

It may be observed that females, who suffer from uterine excitement or hysterical affections, are apt to complain of inability to excrete the urine, and the catheter is often used in such cases; but warm fomentations applied to the hypogastrium, and cathartic injections thrown into the rectum, will almost always obviate any real necessity for its employment in such circumstances.

URINARY CALCULI IN THE FEMALE.

Females seem to be much less liable to the formation of renal calculi than the other sex, and get quit of them more readily when they do occur, owing to the shortness, width, and dilatability of their urethra. Sometimes, however, calculi are detained after descending from the kidney, and nuclei for concretion are also occasionally afforded by foreign bodies introduced from without, through the urethra into the bladder. The stones which have their foundation laid in either of these ways, increase in magnitude in the manner already explained, and occasion

symptoms analogous to those formerly described. Frequent micturition, the urine tinged with blood, and aggravation of these complaints by rough motion, excite the suspicion of calculus in the bladder, especially if the patient has previously suffered the symptoms which indicate the presence of one in the kidney or ureter, and the introduction of a catheter or sound ascertains its existence positively. Women between the ages of twenty and fifty are most frequently the subjects of the disease.

The female urethra being not only very short and wide in its natural state, but also very dilatable, allows small stones to be seized and extracted through it very readily. But when the calculus attains a large size, it has generally been thought necessary, until of late, to enlarge the opening by incision. This may be readily effected by introducing a grooved director, and conveying in by its means a knife, with which the urethra and neck of the bladder are divided obliquely outward and downward, on one or both sides, without injury to the vagina. The objection to this operation is the risk of subsequent incontinence of urine; and the fear of such a consequence has led some surgeons to cut above the pubis, or between the pubis and the orifice of the urethra (Lisfranc). Sir A. Cooper and others have of late years brought into notice a mode of extracting the calculus, which, though practiced previously at different times, had been almost forgotten. This was, to dilate the urethra by instruments contrived for the purpose, or by sponge tent; means certainly preferable to those which seem to have been formerly in use, such as the root of gentian, or a piece of small intestine containing air or water, introduced into the urethra flaccid, and afterward rendered tense by twisting (Bromfield). The process of dilatation must be carried on slowly to prevent an insufferable degree of pain, and other bad consequences. If the stone is large, it will greatly expedite and facilitate the operation to introduce the finger into the urethra, and divide with a straight bistoury any particularly tense part of the canal that may be felt. After this the dilatation goes on much more rapidly, so as to be completed in a few minutes, instead of requiring days. In the event of the operation by incision being preferred, or rendered necessary by the large size of the stone, it is better to cut both sides of the urethra, than to divide one only to the requisite extent.

INCONTINENCE OF URINE.

Incontinence or involuntary discharge of urine, is rarely met with in females, but occurs very often in males. It happens at all ages, and depends on different circumstances. In children, who are frequently subject to it during their sleep, the cause seems to be irritability of the bladder, inducing its expulsive contraction before the fluid accumulates in sufficient quantity to occasion uneasiness enough for awakening the

patient. The fear of punishment, or some other strong impression on the mind, may break this disagreeable habit, by inducing a more vigorous resistance on the part of the voluntary muscles situated at the neck of the bladder; since, as is well known, volition is not entirely suspended during sleep. A more powerful remedy, and one that seldom fails when the morbid disposition has no other source than that under consideration, is the application of a large blister over the sacrum and lower part of the loins. A very distressing incontinence is met with in persons of more advanced age, and often in the vigor of life, who have suffered derangement of the nervous system, either from spontaneous disease or the effects of external injury. The complaint is then usually associated with weakness of the inferior extremities, which betrays the nature of its origin, but it sometimes exists alone, and is of itself sufficient to render the patient miserable. Powerful counter-irritation, especially that effected by the actual cautery applied on each side of the spinous processes of the lower lumbar vertebræ, affords the best chance of relief; and internal stimulants, as cantharides, may be conjoined with this practice, though there is seldom decided evidence of their exerting any beneficial influence. Warm and cold bathing, frictions and strict attention to the preservation of general health should, at the same time, be diligently employed; and improvement must not be despaired of though it should be a long while appearing. Incontinence is common in old age; but in this case is generally confined to the period of sleep, and may be prevented from proving troublesome by introducing the catheter previous to the time of rest. In extreme cases of incontinence, when there is a constant dribbling from the urethra, the patient may be rendered comparatively comfortable by attaching to the penis an elastic bag of India rubber, provided with a plug or stop-cock for allowing the urine to escape when a convenient opportunity occurs.

[The bowels should not be allowed to become costive, and the patient should be put on a strong tonic course of medicines. Xanthoxylin and cypripedin, in conjunction, answer well.—R. S. N.]

IRRITABILITY OR CHRONIC INFLAMMATION OF THE BLADDER.

This complaint is almost confined to males. It is characterized by frequent desire to make water, and inability to resist these calls, however incessant or inconvenient. The feeling before micturition is generally more or less painful, and sometimes extremely so, whence stone or stricture is often supposed to be present, and this supposition leads to the introduction of instruments that greatly aggravate the patient's sufferings. This disease usually occurs in young and middle-aged men. It is occasioned by various circumstances, such as over-distension, which in the first instance causes paralysis of the muscular

fibers, the irritation of stimulating food, or chronic inflammation, spreading back from the urethra, or originating in the mucous coat of the bladder, in consequence of exposure to cold, or other exciting causes of inflammatory derangement.

The treatment consists in using measures of a soothing nature, of which rest, both of mind and body, is an essential one. This, together with a milk diet, copious diluent drinks, and the hip-bath, sometimes proves sufficient. In more severe cases injections of two or three ounces of warm water, with a few drops of laudanum, or the sedative solution of opium, may be thrown into the rectum once a day or oftener. Benefit is also derived on some occasions from hyoscyamus and camphor, administered in the form of pill, also from ten or twelve drops of balsam of copabia, with five or six of the sedative solution, taken two or three times a day, and from small doses of Dover's powder, with colchicum. Blisters applied to the sacrum or perineum, contrary to what might be expected, sometimes afford relief, and a seaton in the latter situation has succeeded after the trial of other means in vain. The operation of *vesicæ lotura*, or injecting the bladder, has often been used with temporary, but seldom with any permanent advantage. A decoction of marsh-mallows, or other demulcent mucilage, with a few drops of laudanum, is introduced by means of a catheter and syringe, or elastic bag, once a day, in such quantity as the irritable bladder is capable of receiving without pain and allowed to remain until the desire of expulsion leads to its discharge. In cases which derive benefit from this practice, it is observed that the quantity of fluid injected, and the time it is permitted to remain, gradually increase. When the disease commences without any assignable cause, it generally proves extremely obstinate, and not unfrequently incurable.

CATARRH OF THE BLADDER.

This title is applied to an inordinate secretion of mucus from the bladder, and discharge of it in the urine, at the bottom of which, when voided, it forms a glairy sediment, sometimes nearly equal in quantity to the fluid. The disease usually occurs associated with the one last mentioned, and, though not necessarily accompanying, hardy exists independently of it. What has been said in regard to the causes and treatment of that affection will therefore apply equally to this.

HÆMATURIA.

This, as the name implies, is a discharge of blood, which may occur as a symptom of other diseases, or exist as an independent affection. In the latter case the hemorrhage is sometimes very profuse, and the blood coagulating in the bladder gives rise to very unpleasant conse-

quences, to remedy which it may be necessary to introduce a very wide catheter, having a syringe adapted to it for sucking out the clots. The discharge of blood may take place either from the surface of the mucous membrane, or from a morbid structure into which it has degenerated. In the latter case remedial means can be of no use, but in the former it is generally possible to moderate and even subdue the morbid flow, by correcting any derangement of the system that has indirectly occasioned it, by soothing the parts concerned if they indicate excitement, and by administering the tincture of muriate of iron, the *uva ursi*, or other astringent medicines.

[Gallic acid and geranin are both excellent agents, but we shall find that the system requires something else. There is under such circumstances a want of vigor in the glandular functions, and the nervous system is usually in an enfeebled condition. Hyoscyamin, asclepin, and rhusin, given together in proper proportion, will usually effect a radical cure.—R. S. N.]

CHAPTER XXI.

DISEASES OF THE GENITAL ORGANS.

GONORRHEA.

By Gonorrhea is understood an inflammatory affection of the urethra, attended with a discharge of thick yellow fluid. As the inflammatory symptoms subside, the discharge becomes thinner, paler, and at last almost watery, when it constitutes what is called a Gleet. This disease is certainly the result of impure intercourse; but whether it requires for its production that the person infecting should have been infected, in other words, whether it is to be ascribed to the influence of a peculiar poison transmitted from one person to another, or whether it may arise merely from excessive and promiscuous intercourse, and then excite similar affections in others, is not yet fully ascertained. There is great variety in the susceptibility of different individuals, and the matter seems active in proportion to its thickness and yellowness. The watery discharge of a gleet, in persons of ordinary sensibility to irritation, is innocuous, but in others it may occasion the most violent gonorrhea.

The first symptoms of the disease generally appear from one to four

days after the poison has been applied. They consist in itching, redness, and swelling of the orifice of the urethra, and are soon succeeded by a painful burning sensation in the same part, particularly severe during micturition, the calls to which are much more frequent than usual. A thin serous exudation then takes place, at first merely gluing together the edges of the orifice, but quickly becoming more copious, and at the same time acquiring a purulent appearance. While these local changes are occurring, the system suffers general derangement in proportion to its irritability, and the acuteness of the inflammation. This symptomatic fever is often attended with local disturbance of different parts. The absorbent vessels of the penis, the glands of the groin, and the testicle, are apt to inflame; abscesses form exterior to the urethra; the prostate and bladder take on a similar diseased action; and various important consequences thus ensue, which will be particularly considered hereafter. The primary and essential morbid action is confined to the extremity of the urethra, from its orifice to the distance of an inch backward.

The treatment requires, in the first place, general bleeding, purgation, and the antiphlogistic regimen, to moderate the inflammation, and allay the fever. The patient at the same time should drink freely of diluent mucilaginous fluids, such as rice-water, or linseed tea, and foment the penis frequently with warm water. When the intensity of the disease has been subdued, internal and external means may be employed to stop the discharge. Of the former, the balsam of copaiba, and cubeb pepper are the most powerful; and they act much more certainly when administered in substance, than when their virtues are attempted to be concentrated by decomposition into extracts or essences. As the copaiba is not only extremely nauseous, but apt to excite sickness, vomiting, and great general uneasiness, it must be given cautiously, in small doses, combined with camphorated mixture, spirit of nitrous ether, or some such vehicle, and a little laudanum or muriate of morphia. The cubebs may be given more freely, either along with the mixture just mentioned or alone. One or two drachms may be prescribed, three or four times a day, and milk seems to be the best medium for its administration. The external remedies are injections of stimulating and astringent fluids into the urethra. For this purpose the solutions of several metallic salts, as the sulphates of zinc and copper, the acetates of lead and zinc, and the nitrate of silver, are chiefly employed. The best is perhaps six grains of sulphate of zinc dissolved in four ounces of rose-water; and the others are generally used about the same strength. No injections should ever be employed until the symptoms of inflammation have been subdued; and even then if the patient has an irritable constitution, they ought to be

prescribed with extreme caution. Not more than a quarter of an ounce should be thrown in at once, and the penis should be compressed between the finger and thumb at the neck of the glans, to prevent the fluid from passing farther back than this, which is the limit of the disease. The injection may be repeated three or four times a day, unless it occasions a renewal of the inflammatory symptoms, when it must be immediately abandoned. If, notwithstanding these means, the running continues several weeks, a full-sized bougie may be passed two or three times, as the irritation thus caused, though its first effect is to render the matter discharged more thick and copious, often puts a sudden stop to it. The tincture of cantharides in the dose of twenty or thirty drops three times a day, sulphate of zinc, given internally in the form of pill, and sea-bathing, are the remaining remedies usually had recourse to when the gleet proves obstinate. In cases of old standing, the application of a little diluted citrine ointment to the surface of the urethra, for the extent of an inch from the orifice, sometimes effects an almost immediate cure. The first gonorrhea is generally much more severe than any that happen subsequently. In these the inflammatory symptoms are often from the commencement so mild that the means proper for arresting the discharge may be used without delay. It is in such cases that cubeb pepper proves of the most conspicuous service, a desertspoonful of it given two or three times a day frequently cutting short the disease.

Of the bad consequences or attendants of gonorrhea, one of the most constant is chordee, or painful erection of the penis. The only effectual remedy of it is to cure the disease; but before this is accomplished the patient's sufferings may be alleviated by opiate injections into the rectum; the introduction of a grain of solid opium within the *sphincter ani;* or pills of camphor with hyoscyamus taken occasionally. If the spongy or cavernous substance of the penis remains hard after the inflammation has subsided, and causes pain, together with the distortion of the member when it is erected, the part affected may be rubbed with camphorated mercurial ointment, to promote absorption of the condensing lymph that is effused. Inflamed absorbents are met with chiefly on the dorsal surface of the penis, and in persons of a very irritable constitution. They form hard painful cords, over which the skin is red. The best application that can be made to them, is a warm solution of acetate of lead and opium. Inflammation of the inguinal glands, or Bubo, does not occur nearly so frequently, in consequence of the irritation of gonorrhea, as of that proceeding from sores of the penis, and, therefore, may be more properly considered in connection with them. Abscesses sometimes form in the cellular substance exterior

to the urethra, at all parts of its extent, from the orifice back to the anus. So soon as they are recognized, an incision ought to be made for the evacuation of the matter, which, if permitted to make a way for itself, may cause ulcerative absorption of the mucous membrane. When the inflammation spreads back along the urethra to the bladder, it induces the painful symptoms which have been described under the head of retention of urine from spasm, and irritable bladder, and requires the treatment that has been already explained in regard to them. Inflammation of the testicle is a common attendant of gonorrhea, but will be more conveniently arranged along with the other morbid affections of that organ.

[In the treatment of no other disease does the erroneous pathology of Mr. Syme, and its consequent deductions, assume a more palpable form. One would think, from the experience of the profession during the past twenty years, that so able a surgeon as Mr. Syme would have been the last in giving such advice and directions in the treatment of this disease. The plan, as a mere experiment, has never given entire satisfaction, and while it has often failed entirely, it has occasionally destroyed the unhappy victim who had trusted it. It is only since the pathology of the disease has been closely watched and demonstrated by specialists, that the profession has learned to treat the disease with something like a rational theory. Presuming that the readers of this work will all possess a tolerably thorough knowledge of the physical characteristics and pathology of gonorrhea, I proceed to the consideration of that which is more directly interesting to the surgeon and the patient—the getting cured of the complaint. Let me here declare, in the language of a celebrated Irish professor, that if any surgeon fails to make a perfect cure of a case of ordinary gonorrhea in seven days, he thereby demonstrates his unfitness to practice medicine. I am perfectly aware that some patients will *not* follow directions; and hence, the cure is sure to be somewhat retarded. In the first place, let me declare that there is no occasion for depleting the patient—the drain set up by the disease reducing him quite fast enough; nor is there any reason, or even common sense, in putting him on a spare and innutritious diet, while his stomach is loaded with stimulating medicines. The common routine practice—niter, copaiba, cubebs, etc.,—is worse than useless in a great proportion of cases, and never the best agents in any.

One of the first considerations for the surgeon, is the circumstances of the patient, by which I mean his age, habits of life, constitutional stamina, etc. Upon a due recognition of these will depend the success which is to attend any mode of practice. Whoever understands the general pathology of the human system, need hardly be reminded of

this. If the patient shall be enemic, his case will require a very different treatment than would be required for a plethoric and vigorous patient. The diet, as a general thing, may be left untouched; for the errors derived from a very rich and even stimulating diet, are less dangerous than the withholding the elements of regimen which are demanded to keep up the system, in opposition to the drain set up in it by the gonorrhea.

Before any plan can be adopted, it will be necessary to determine the character of the inflammation that is present; how far it has progressed; what stage the disease has attained; and what are its complications. These points having been settled, it will then be necessary to remove the existing inflammation, and repair the tissues injured by its action—to heal the diseased tissues.

The inflammation is to be subdued by general and local treatment; the first consisting of all those appliances which are useful in equalizing the circulation, of arousing the secretions, and of facilitating excretion. To effect these ends, it will be proper to administer a brisk cathartic, and follow it up by the free use of asclepin and macrotin, to which a little gelsemin may be added. Keep up the use of this combination of concentrated medicines until the skin is very active in the performance of its functions. Then, to stimulate the kidneys to free action, we may use some of the essential oils, along with a tea made of buchu and marshmallow. As local applications, there is nothing superior to injections of solution of veratrin, hyoscyamin, and lupulin, or if it be not a recent case, the sulphate of zinc will be quite sufficient, or cold water may be substituted for the zinc solution. The muriated tincture of iron is also a good injection; but more depends on the mode of injecting than upon the agent used. Let nothing be injected until the urine has been passed, not even water, and then you need not be afraid of throwing in a full drachm, and holding it in for half a minute or so. If an experienced operator shall use the syringe, cold water, with the addition of the agents for internal use above recommended, will be all that is required. When using astringent injections, especially of silver, copper, zinc, etc., we must be on our guard for stricture, which is worse than the gonorrhea, although Graves and other eminent practitioners have shown, that with zinc, if properly employed, and under the proper circumstances, no such result need be anticipated. I have never had a case of stricture since I understood the true theory of injection.

As an internal prescription, which is to be mainly relied on, we shall find the following as reliable as any, although it will be seldom necessary to resort to it if we use the means previously indicated: tinc. cubeba, oil cinnamon, mel, gum acacia, gallic acid, benzoic acid,

and water. These agents, properly combined and scented with oil sassafras, form a draught which is not unpleasant, and which certainly acts most charmingly. I do not give the proportion of each agent, for that must depend very much on the patient's constitution, his habits, and the stage of the disease. By an examination of the therapeutic properties of the above agents, it will be seen that the combination is highly carminative, while the different ingredients both tend to equalize the circulation, to excite the secretions, and to exert special influences on the organs to be relieved. Injections of cold water, several times a day, together with a plentiful diet, and nocturnal rest, will quickly subdue the disease. Then there will be no sequelæ left. The digestion will be improved rather than injured, and the patient rapidly acquires his usual health. Perhaps, in the treatment of no disease, have there been a greater variety of plans recommended than in the treatment of gonorrhea, blennorrhea, and gleet, all of which, however, are but phases of one and the same disease. The bleedings, copaiba, mercury, etc., recommended by Mr. Syme, are by no means to be adopted if we desire success to attend our practice in the treatment of this disease.—R. S. N.]

GONORRHEA PREPUTIALIS.

A purulent-looking discharge is occasionally induced from the surface of the glans and prepuce in persons who have this covering long, and the lining integument of its inner surface approximating the nature of a mucous membrane. From the tightness of the prepuce in such cases, it is generally difficult to bring the orifice of the urethra into view, and the source of the running is, in consequence, often referred erroneously to the usual seat of gonorrhea. As this mistake leads to improper practice, the preputial disease requiring merely local applications, it ought to be avoided by carefully drawing back the foreskin until the opening of the urethra comes into view, and then squeezing the penis so as to force out the matter, which will show by the direction whence it comes, where it has been secreted. The absence of pain in making water affords another good ground of distinction between this form of disease and the other. The treatment consists in injecting the black-wash four or five times a day between the glans and prepuce.

[This disease often attacks children—boys—at an early age, though the cure is mostly spontaneous.—R. S. N.]

WARTS.

A very common consequence of gonorrhea, particularly of the preputial kind, is the growth of warty excrescences, chiefly round the

Fig. 134.



neck of the glans, and by the side of the frœnum; but they may be seated on any or every part of the surface of the glans and prepuce. These growths vary extremely, both in size and number, being sometimes hardly perceptible, and at others constituting large tumors. They have generally narrow necks and irregular rough bodies. They are painful and unseemly, apt to bleed when injured, and, if large, attended with a very fetid discharge. If small, their absorption may be readily induced by a slight application of aromatic vinegar once every two or three days. Various other fluids, powders, and ointments have been employed for this purpose; but the one that has been mentioned seems to be, on the whole, the best. When the warts are large, they should be cut away with scissors close to the sound skin, and even when but of small size, they are removed in this way more quickly as well as effectually.

SORES ON THE PENIS.

The penis, like every other part of the body, is liable to become the seat of ulceration; and its pendulous position, mobility, and proneness to erection, much oppose the healing process. With few exceptions, the sores which are the seat of this morbid action result from venereal intercourse; being either simply abrasions or lacerations, or the consequence of the irritation of poisonous matter applied to the organ. The former are usually called excoriations, and the latter chancres. The poison gives rise to the ulcer by forming, in the first instance, a small abscess or pustule, which, opening in a few days, leaves a breach in the surface. If an excoriation, at the time of its production, is exposed to the influence of irritating matter, it then exhibits the same characters as if of poisonous origin. The sores of both kinds are generally seated on the lining membrane of the prepuce, near its reflexion on the glans, at its orifice, and at the sides of the frœnum; being more rarely found on the glans itself, or the body of the penis. When resulting from poison, they are generally small, round, or oval, and excavated, having the base as well as the margin condensed by an interstitial effusion of lymph, and affording a viscid discharge. When caused by violence, they are usually of an irregular figure, and surrounded with more or less hardness, according to the irritation which they have suffered from the matter applied to them. The surface of both kinds is generally gray, yellowish, or ash-colored, and shows no appearance of granulations. The pain is very variable.

When the sore is in a highly irritable state it usually presents either a phagedenic or sloughing character. In the former case, the ulcer, which is generally seated on the body of the penis, is round, shallow, and very abrupt at the margin, which is red, while the surrounding integuments are not altered from their ordinary state. It is very painful, and increases progressively, preserving the characters that have been described, and enlarging in superficial extent without becoming deeper. In the sloughing state the sore is surrounded with much tense swelling, and diffused redness. The pain is intense; and the margin of the sore, which is very irregular, at one or more parts, exhibits sphacelated spots.

Owing to the peculiarities of their situation, and also of the circumstances which attend their production, sores on the penis are generally very slow in healing, unless properly treated; and even then often require more time for the purpose than might be expected beforehand from their size. It was very generally believed until lately, and the opinion is still maintained by many, that the poison which gave rise to chancres was of a peculiar kind, which had not existed in Europe until the latter part of the fifteenth century, when it suddenly appeared at the siege of Naples; having either originated there, or been brought by Spanish soldiers who had imported it from the newly discovered western world. This poison of Syphilis, as it has been called, was supposed to produce various other effects besides the primary sore, when absorbed from it into the system; first causing bubo, and then a succession of constitutional disorders that were termed secondary symptoms. Of these the most important were scaly eruptions of the skin, ulceration of the fauces, exfoliation of the bones of the nose, chronic inflammation of the periosteum and bones, ulcers on the surface of the body, cachetic emaciation, and death. It was farther believed that mercury, administered so as to produce its constitutional effect, or feverish excitement with salivation, acted as a certain antidote to this poison, whether operating locally or generally; but that unless it encountered the poison previously to being absorbed from the sores, it merely arrested the morbid derangement in progress, without preventing the occurrence of the other secondary symptoms, which required successive courses of salivation for their remedy. It is now fully ascertained that the poison of the present day, though producing local effects in all respects similar to those described as resulting from syphilis, does not give rise to the dreadful consequences which have just been mentioned, when treated without mercury. The cure may be tedious, and the skin, throat, or periosteum may be slightly affected, but none of the serious effects that used to be so much dreaded ever appear; and even the trivial ones just noticed comparatively seldom present themselves. We must therefore conclude either that the

violence of the poison is worn out, or that the effects formerly attributed to it depended on the treatment. The latter of these opinions is supported by the fact, that secondary symptoms of the utmost severity embittering the patient's existence and ultimately destroying it, are still met with in the practice of those who employ mercury profusely and indiscriminately; and it is a curious circumstance, which cannot be either explained or denied, that this medicine produces these effects, more especially those on the bones, only in persons who are suffering from venereal ulceration of the genital organs. The quantity of mercury requisite for thus injuriously affecting the system is very variable—depending upon peculiarities of the patient's constitution, either natural or acquired. Of the former, a scrofulous disposition may be particularly mentioned, and of the latter, one of the most important, is that occasioned by mercury itself; since a person who has taken it to such an extent as to have been violently salivated, or otherwise disordered by its operation, is ever after very susceptible of its effect. It is generally noticed that those persons suffer most from mercury, who are least readily salivated by it.

Though mercury is thus extremely injurious when given largely, and requires caution even when used sparingly, it ought not to be abstained from altogether in the treatment of venereal diseases, unless the state of constitution is peculiarly unfavorable, since, under proper management, it often greatly accelerates recovery, both from the primary sore and from the different derangements of the system which are the consequence of the local disease simply, or which are produced by the means employed to cure the patient. It should never be given with the view of producing salivation, but merely to promote the secretions, and act as an alterative in restoring a healthy state of the system. For this purpose five grains of the blue pill should be given every other night, and the patient should use a restricted regimen, with the decoction of sarsaparilla for a diet drink, gentle doses of the saline cathartics being taken occasionally to keep the bowels perfectly open. It does not appear that the sarsaparilla produces good effects, farther than by making the patient conform more strictly to dietetic rules, and, therefore, the use of this medicine, which is attended on a large scale with much expense, does not seem either beneficial or warrantable in hospital practice. Mercury should not be given when the system is in an irritable state, predisposing to phagedenic ulceration or sloughing. In this case, bleeding, opiates, change of air, or whatever other means are suggested by general principles for allaying the intensity of action, must be employed. Instead of using mercury pill, which even when thus restricted in its employment, is not free from the danger of doing harm, I prefer the hydriodate of potass, in the dose of two grains taken three times a day.

The local treatment must be varied according to the circumstances of the case. In the first instance, as soon as possible after the appearance of the disease, it is proper to destroy the morbid action of the part by touching it with the nitrate of silver; and then the black-wash, or a solution of sulphate of copper, containing two grains in an ounce, may be applied on a piece of lint. If the orifice of the prepuce is contracted so as to prevent it from being drawn back, the black-wash should be injected four or five times a day, which is better than laying open the fore-skin, as the cut surface is sure to take on a similar action with that of the ulcers, and thus prolong the cure. When the sore has a phagedenic character, a bread-and-milk poultice is generally the most useful application in the first instance, for a few days, and then a strong solution of sulphate of copper, containing two scruples to the ounce, used merely to moisten the surface once a day, with some milder lotion in the intervals, proves most efficient in arresting the progress of the ulceration, as well as promoting granulation. The disposition to slough depends on excessive irritability, which in general is owing to too great power of action, and requires measures of depletion, together with those of a soothing kind. Leeching, scarifying, fomenting, and poulticing, acetate of lead, and watery solutions of opium, are the means found most useful for this purpose, and all of them, except the first two, may be used with advantage also when the irritability is associated with weakness of the part.

If secondary symptoms appear, they ought to be treated merely on the ordinary principles which guide the practice in regard to them when proceeding from other causes. In affections of the skin and throat, the common blue pill, and the compound calomel pill, are the best forms of exhibiting mercury so as to obtain its alterative effects. But it is much better to abstain from mercury altogether, and either trust entirely to local means, together with a suitable regimen, or employ iodine in some of the forms in which it is usually prescribed. The simple solution of the hydriodate of potass seems to me the most convenient. In affections of the periosteum or bones, which, as already mentioned, never occur in a severe form except when the patient has suffered from the mercurial influence, iodine is also found eminently useful, the appropriate local treatment, and especially the regulated application of blisters being at the same time employed. Should it fail in affording relief, corrosive sublimate may be administered, in very small doses, such as the eighth, or sixteenth of a grain two or three times a day, given either solid or in solution, and combined with some anodyne or diaphoretic vehicle. If mercury were never used improperly, the treatment of venereal diseases, both primary and secondary, would be very easy; and as its abuse is every day becoming less common, there is reason to hope that the formidable class of

mercurial diseases, on which volumes have been written, and particularly ulcers of this origin on the genitals, skin, mouth, and throat, will soon cease to be met with in practice. In regard to them, it will be sufficient to state at present, that time, careful attention to the general health, and for local applications, the nitrate of silver, sulphate of copper, and the black-wash, are in general the best remedies. When the obstinacy of the sore is excessive, it may be necessary to destroy the surface by caustic potass.

ORIGIN AND HISTORY OF SYPHILIS, WITH ITS TREATMENT.

[The etymology of this term, like the origin of the disease itself, is unknown. The term was coined by Fracastorius, and introduced into nosology by Sauvages. In the Bibliography which is furnished to M. Ricord's work by Dr. Thos. F. Betton, are enumerated upward of one hundred and fifty treatises on this subject, beginning in the year 1495, and ending with the year 1843. Though the origin of this disease, like that of some nations, is lost in the dim shadows of antiquity, and the attempt to trace it to its source would be like wandering in the Egyptian labyrinth or the catacombs of Rome without a thread; and though we cannot tell whence it came nor whither it is going, yet the history of its sad and desolating effects is too well known to the world to leave us in doubt in regard to its existence and character. It is highly probable that the malady had its origin in excessive amativeness. As all punishment is the result of an infraction of natural or moral laws, and the infliction partakes of the nature of the offense, so we may trace legitimately this dreadful disease to prostitution or licentiousness. In regard to its high antiquity there can be no doubt, and indeed from the violence and abuse which characterized the antediluvians when, in the striking language of the inspired volume, "from the crown of the head to the sole of the foot there was naught but wounds and bruises and putrefying sores, which could not be bound up nor mollified with ointment." And it requires no great stretch of the imagination, to suppose that among the causes which provoked the Divine wrath, and resulted in the destruction of the race, might be enumerated the sin of licentiousness. There were giants in wickedness as well as giants in physical form, among the antediluvians, and their abuse of the daughters of men resulted in that entire and universal "corruption of all flesh," which caused the Almighty to sweep them away with a flood.

The waters of the deluge were not sufficiently efficacious to wash away the taint and pollution of human depravity. "The imagination of the thoughts of the hearts of the children of men still continued evil," and this evil was communicated to the descendants of the new world. Licentiousness may be said to have been, and continues to be,

the great sin of the human race, and has always been found associated with idolatry as its twin sister. The fire-storm which fell upon Sodom was not more preternatural in its character, than were the unnatural crimes of the guilty inhabitants of that devoted city. Here licentiousness existed in its worst and most repulsive forms. After all the forms of licentiousness, in which the sexes could indulge, had been carried to the greatest excess, and every invention for the perpetration of the greatest enormities, in the intercourse of the sexes, had been exhausted, the bloated, lecherous libertines sought the gratification of their worse than brutal passions in the use of each other. Nor did they stop with the horrid sin which to this day is called "sodomy," but they added thereto the more horrid sin of bestiality, a crime without parallel for enormity.

As it is generally admitted, that to prostitution must be traced the origin and propagation of all infectious diseases of the genital organs, and as the greatest prostitution existed in the earliest ages of the world, it is no difficult matter to come to the conclusion that syphilis has existed, in some of its forms, from time almost immemorial; especially will this be evident, if we consider the wide-spread evil of prostitution. In the early history of Babylon, young girls were obliged to repair to the temple of Succoth Benoth, the Venus of the day, and wait, until, through her priests, the goddess accepted the offering of their virginity; and even to this day, in the pagodas of India, young girls are brought to the temples of the Brahmins, who retain them for the service of their divinity. The Egyptians, especially at Heliopolis, prostituted their daughters to gain thereby the means of existence. The oriental princes were always accompanied in their expeditions, by a number of wives and concubines, as we learn from the history of Darius, Cyrus, Xerxes, Cambyses, and others. Many of them followed the custom prevalent in Persia, Media, and Egypt, of marrying their own sisters, as did Cambyses, after violating her. The feast of Belshazzar, the last of the kings of Babylon, in which this licentious king caused his wives and his concubines to appear before him naked, and drink out of the sacred vessels, shows to what extent licentiousness prevailed only five centuries before Christ.

We may argue even in the absence of facts, did we not have access to them, and that in the greatest abundance, that the wildest and most ungovernable licentiousness has existed from the earliest ages, from the fact that those who were singled out from the corrupt masses, as the men that feared God and wrought righteousness, were themselves not wholly exempt from the evils by which they were surrounded. Abraham, instructed by his own wife, had intercourse with his maidservant, the beautiful Egyptian, which resulted in Ishmael and his

progeny. Lot had intercourse with his own daughters, which resulted in Moab and Ammon and their descendants. Jacob married two sisters, who gave up their most agreeable and beautiful handmaids to his embrace, for the purpose of multiplying their progeny. Reuben sought the bed of Bela, the concubine of his own father, Jacob; and Judah shared his couch with his daughter-in-law, Tamar, after she had lived with her husband's brother.

The custom which had its origin in the divine command, "to increase and multiply" the human species, degenerated into a mere sensual gratification, and finally into incontinency and debauchery. The beautiful and treacherous Delilah, the mistress of Sampson, after having granted him the last favors a woman can bestow, drew from him the secret of his strength, and betrayed him into the hands of his enemies. King David, having already married two wives, took a third, the cunning Abigail, the wife of Nabal, from whom tradition says he caught a disease, which, although it may not have been syphilis, nevertheless one would be led, from the history furnished by himself, to consider as wonderfully resembling it. Referring to what his enemies say of him in one of his Psalms, "an evil and sore disease say they cleaveth unto him;" and again, in describing his own condition he says, "my sore ran in the night, there is no rest in my bones because of my sin. My wounds stink and are corrupt because of my foolishness, for my loins are filled with a loathsome disease, and there is no soundness in my flesh." These and several other passages of like import, indicate most clearly the nature of the disease which caused his enemies to utter such scandalous reports about him. Nor did his son Solomon, whose amatory songs and sports with his numerous concubines have made it difficult for the righteous to place him in the category of the saints, escape the fatal infection. Like the sons of the old prophet Eli, he made himself vile with women, and he who so graphically described the arts of the seducer and the dreadful consequences of yielding to her embraces, could from experience warn the youth of her seductive wiles. And Absalom, another son of David, fired by libidinous impulses, seized his father's concubines and made them the ministers of his pleasures.

We mention these, among numerous other instances in sacred history, to show how extensively this master sin has entered into the evils which inflict our race, and how the consequences, as deadly streams from a corrupt fountain, have come down to the present day.

The pure principles of Christianity to a great extent improved the moral condition of that part of the world where they were introduced, with the exception of the East, where polygamy is perpetuated under the forms of an idolatrous paganism. Mahomet made it legal, and

a Mussulman can have as many wives as he chooses. The Sultan has had as many as two thousand in his seraglio at one time, and Circassia and Georgia are robbed of their choicest and most beautiful treasures in filling the harems of the wealthy. In ancient Greece, particularly in Corinth, the priestesses of Venus were courtesans whose favors, bought at immense prices, contributed to add to the splendor of the city. The epistles of Paul to the Corinthians, Ephesians, and other places in Greece and Asia Minor, addressed to the Christians, correcting the errors and vices among them, show most conclusively that the great sin of the inhabitants of these cities was their unbridled licentiousness; and the epistle of the same to the Romans, in which he describes the vices of its inhabitants, including every species of licentiousness, even down to the horrid crimes of sodomy and bestiality, present in an awful light the character of the enlightened inhabitants of the Eternal City. Licentiousness, among the Greeks and Romans, was not considered at all disgraceful. Many of their festivals and religious ceremonies were of the most lascivious character. In the festivals of Priapus or Bacchus, the *lingam* or *phallus* was borne as an emblematical standard. This *phallus* was a *penis fictitius ex variæ materia confectus variosque in usus*. It was also made in the shape of drinking cups of gold or silver. At Sparta the laws of Lycurgus permitted the young women to enter the lists in a state of perfect nudity, and contend for the prizes of the various games. The Lacedemonian legislators, who condemned celibacy as infamous, permitted husbands to lend their wives to the embraces of other men. About the year 726 B. C., the Spartans having lost a great battle, abandoned their wives and daughters to the most robust soldiers, in order to repair the loss of the men slain. In Athens the philosopher Crates was one day surprised *in coitu* under the portico of the temple, so general was the prevalence of licentiousness. The most famous of the Greek courtesans was Aspasia of Miletus, who lectured on eloquence at Athens, taught rhetoric to Socrates, and inspired Pericles with so violent a passion for her, that he consulted her on public affairs, and she frequently composed his orations. Leontium, another celebrated prostitute, was a follower of Epicurus and mistress of his philosophy. She had a daughter named Danae, who adopted the profession of her mother, and was the concubine of the Governor of Ephesus. Still more famous was Lais, surnamed the Corinthian, who lived about the year 340 B. C. Her fame has descended to modern times, and, according to Propertius, all Greece slept at her doors. Plutarch states that she had an army of admirers, all eager for her favors. Demosthenes, having visited her for the purpose of passing the night, and finding that her price was a thousand drachmas, retired, saying, "I cannot purchase repentance at

so dear a rate." A wise saying that, for the eloquent orator. History has preserved the beautiful anecdote of Leona, a courtesan of Athens, who, in the year 513 B. C., being privy to the conspiracy of Harmodius and Aristogiton against Hipparchus, the son of Pisistratus, and threatened with torture, bit off her tongue rather than betray the secret confided to her. Three centuries after her lived Phryne, beloved by Xenocrates and Praxiteles. Like the celebrated Ninon de l'Enclos, of modern times, she had a lover in her old age which led her to remark that "even the lees of a good and generous wine possess some value." A courtesan named Psaphion, in Smyrna, who acquired the title of the *Venus of Smyrna*, received more visits at her house than the temple of Venus itself. While the courtesans of Greece ministered to the pleasure of the opulent, Italy, or rather Rome, gave free course to the doctrine of Epicurus. Luxury, effeminacy, and sensuality pervaded all classes. Adultery became frequent, and libertinism and concubinage were the order of the day. Flora, a celebrated courtesan, left an immense legacy to the city of Rome, in order to found public games in her honor. The Senate accepted the bequest, and the festival occurred every spring, at which time naked prostitutes appeared, traversing the streets at the sound of trumpets, and throwing themselves into the most lascivious attitudes. The courtesans appeared not only in the festivals of Flora, but likewise in the theater, at the representation of the Rape of the Sabines, and prostituted themselves after the play. Heliogabalus, a Roman emperior famous for his debaucheries, obliged them to represent nature in all its realities, and consummate their adultery on the stage. The Roman prostitutes celebrated festivals in honor of Venus, and offered to her incense and flowers, praying for beauty and the arts of pleasure and seduction. They also made vows to Marsyas, Hermes Pertunda, and Voluptas. At Rome, the houses of prostitution were in retired places, in by-streets, near the ramparts, the environs of theaters, the circus and the stadium. The prostitutes of Rome were called *lupæ*, or she-wolves, and their houses *lupanaria*, in allusion to the suckling of Romulus and Remus by a she-wolf. Their chambers or cells were mostly under ground, and arched like an alcove—*fornix*—and hence arose the term *fornication*, or the commerce of the sexes. Corruption became so general, that even women of high rank gave themselves up to licentiousness. The Emperor Augustus had connection with the wives of the most illustrious personages, and committed the shocking crime of incest with his own sister Julia. During the day, the Emperor Tiberius preached morality, and was so favorably impressed with Pilate's account of the crucified Jesus, that he desired to have his name placed with the gods of the Pantheon; yet he spent every night in drinking, served by naked girls who ministered to his plea-

sure. Caligula violated his own sister Drusilla, and lived with the others. He took great pleasure in exhibiting his wife naked to his friends, and dishonoring the most distinguished women in the presence of their husbands. He established an apartment of prostitution in the very palace of the Cæsars, for the purpose of increasing his revenues. Domitian dallied with prostitutes, and lived publicly with his neice, the daughter of his brother Titus; and lastly, Baracalla, buried three vestal virgins alive, after having violated one of their number. Nero solemnly married the eunuch Sporus dressed as an empress. He had already repudiated the unhappy Octavia and the infamous Poppæa. Julia the only daughter of Augustus, famous for her wit and beauty, rendered herself still more famous for her licentiousness. The reign of Heliogabalus might be called the golden age of prostitution. In Josephus' history of Apion we are informed that the subject of his narrative came to his death by ulcers of the *genitals*, which had become *gangrenous*. Sacred history informs us that Herod, the king of the Jews, met with a similar fate from a similar cause. Galerius Maximianus perished of ulcers on the penis.

As Christianity became known, prostitution received a check, and no longer able to obtain the sanction of law and imperial authority, was held in abeyance. The Emperor Constantine, guided by the beautiful morality of the Gospel, exerted himself to suppress licentiousness. He enacted laws prohibiting the crime against nature which had been so common in Rome, and which is so graphically described in Paul's epistle to the Romans, and closed several temples renowned for their licentious orgies. Theodosius declared that parents or masters who wished to prostitute their children or their slaves, had lost all their legal rights over them—a most wise and humane regulation. Valentinianus, and afterward Justinian, labored hard to abolish prostitution in the Roman empire.

The private lives of a great number of the monarchs of ancient and modern France were sullied by crimes and adulteries inherited from their Roman conquerors, and fostered until the coming of the Revolution, which swept them and their imperial debauchery as the fire-storm swept Sodom and its guilty inhabitants, forever from the earth. Paris, at that time, seems to have been one vast brothel, where female honor and virtue were scarcely known by name, and even if supposed to exist, were considered rather as a reproach than an ornament. During the Middle Ages, licentiousness was universal, and libertinism everywhere prevailed. The chiefs and nobles plundered, ravished, and murdered their victims with the most remorseless brutality. The history of the first two kings teems with cruelties, murders, and treasons, prompted by illicit passion and unbridled lust. Foremost in debauchery stands Childeric, the fourth in order of succession from Paramond.

The licentiousness of Childeric knew no bounds. He carried off and violated the wives and daughters of the vassals, without regard to any rights, human or divine. Expelled by an indignant people from the throne, he seduced the wife of another king, who had given him shelter, and the adulterous commerce lasted eight years, without any opposition on the part of his host. Childeric's wife followed his example, forgetful of herself and her children, so common was the custom at that time. Clovis the first Christian king, was the son of Childeric, and had, beside his wife Clodinda, a great number of mistresses. Clothaire I, one of his grandsons, led a life of adultery, incest, and crime, and had five concubines. Charibert had three crowned queens, as also Gontran, who gave himself up entirely to the most extravagant lewdness, and was ably succeeded by the cruel Fredegonda, who was famous for crime and prostitution. Dagobert repudiated his lawful wife, and married three others at once. The bishops, after the manner of the Orientals, kept several wives or concubines. Pepin closes the first race of kings, and commences that of the second, by being the father of Charlemagne, who was crowned Emperor of the West. The glory of this prince, says Mezerai, would have been without a stain, except for his love of women, and his blindness to the irregularities of his mistresses and daughters.

The aim of Francis 1 was to dignify and ennoble prostitution by abandoning the public women of the palace to his subaltern officers, and substituting therefor ladies of noble blood. But he had another motive. Having contracted the venereal disease, he was base enough to desire to communicate the infection to others. He was countenanced in his libertinism by the nobles and the clergy. The right of sleeping the first night with their female vassals was religiously insisted upon, and bishops and abbies exercised it as their privilege, as high barons. The inferior clergy visited the taverns and brothels, and monks paid their procurers with the wealth of the church. In certain dioceses the grand vicar sold indulgences to commit adultery for one year; in others a cask of wine would pay for their right to commit fornication for a life time. In order to justify the king in a selection of girls of noble blood, it was urged that from the purity of their persons they could not communicate the venereal disease to the noblemen of the court, like the common prostitutes. But the atrocious monarch infected them all, and corrupted public morals at the same time. The girls thus infected communicated the disease to the nobles, and thus the whole court became a mass of corruption. The principal mistress of the king was M'lle d'Helly. He then surrounded himself with a number of young girls equally noble. This lecherous king at length died of the loathsome disease he had communicated to others.

Debauchery survived Francis I, and was fostered by his succes-

sor, Charles IX, and his mother, Catherine De Medicis, and his grandson, Henry III. The reigns of Henry IV, Louis XIII, Louis XIV, the Regency, and of Louis XV, were marked by the same licentiousness and disregard of public decency and of morals, until the earth shuddered at the crimes committed in defiance of all the principles of morality and justice, and washed out the foul stains on the name of man with the blood of the revolution.

Never has a particular sin met with a more direct and specific punishment than the sin of licentiousness. Well did the wise king of Israel say of those who practice whoredom, that they "shall mourn at the last, when their flesh and heart are consumed, and say, how have I hated instruction, and despised reproof." Would that the experience of the past were improved by the present generation; that the guilt and wretchedness of those who have turned aside from the thorny path of virtue, and listened to the siren voice of unlawful pleasure, periling their happiness for time and eternity, and entailing misery upon their children and children's children, to the third and fourth generation, for a momentary gratification in the indulgence of an unlawful passion, might prove a warning to the transgressor.

In our rapid sketch of the evil of licentiousness which has been found to exist in all ages of the world, the reader will be able to trace the origin of this dreadful disease. We have, however, but fairly entered upon its history. The scanty materials furnished us have only enabled us to glance at the existence and prevalence of the disease in several countries. Had we the records of the vast empires of China and India, together with hither and farther Polynesia and the vast continent of Africa, what we have been considering would be as a drop in the vast ocean of human depravity and wretchedness. In our relation of the causes traceable to this enormous and unnatural licentiousness, we have seen that it has prevailed from the earliest times in all countries whose historic records have come down to the present day. In continuing this history we have approached a period in which the materials are so abundant and ample that a mere outline itself would fill volumes, and our readers must allow us, as we design only a practical sketch, to take a wide range, gathering up here and there what may prove of profit and advantage to the medical practitioner and the general reader.

Many writers on the origin and history of syphilis are disposed to give it a Neapolitan origin; but, from the researches of Hensler, Gruner, Jourdain, and Simon, it appears impossible to deny that the venereal disease existed long before, as they found in ancient writers on medicine, and in those of the Middle Ages, in history, in chronicles and collections of the poets, proofs of the truth of their assertion. Balanitis and vaginitis were known to the ancients. They sometimes

described these diseases under different names, and sometimes only indicated their principal phenomena without naming them. Lucius Apulius certainly means balanitis when speaking of remedies for the *pruritus* and *burning* of the penis. Does not Oribasus designate vaginitis by this expression — "*mordicationis et pruritus vulvæ?*" Does not Ætius refer to both diseases when he proposes remedies for abrasions of the genital organs? These authors and many others say nothing of the discharge preceding the first stage of these maladies, and perhaps attached no more importance to them than we now do to the discharge following coryza, or the expectoration of bronchitis. Perhaps, also, the disease called dry gonorrhea was then more common than at the present day. This is the opinion of M. Jourdain, and in the language of this erudite author, "Physicians, anterior to the fifteenth century, admitted two species of this disease, according as it appeared on the glans, the orifice of the female genitals, or in the interior of the canal of the urethra. As they believed the origin of the disease different in these cases, so they attributed one to external, and the other to internal causes. The first variety, designated under the name of burning—*ardor*, *calefactio*, *incendium*—belonged exclusively to the domain of surgery; while the other, called *ardor urinæ*, was the peculiar province of the physician." This word *burning* occurs frequently in the writings of Lanfranc, of Milan, William, of Salicetto, and others, and the expressions used by them and other writers of the Middle Ages, sufficiently attest that these affections depended on cohabitation with prostitutes. Those females who labored under the affections of the genitals, were considered foul, impure, and unclean.

According to Astruc and Girtawner, urethritis, in both sexes, appeared only about the year 1550. They rely upon the authority of Gabriel Fallopius, who thus speaks: "The last symptom is the French gonorrhea." But Fallopius appears to have written two years before his death, thus making the appearance of gonorrhea five years earlier. Discharges from the genitals, known to us as balanitis, vaginitis, and urethritis, have been described by Ali Abbus, Avicenna, Avenzoar, and others. The *ardor urinæ* designated by John of Arden under the name of *brenning* (*burning*), was described by Valerius, Constantine, Africanus, Gariopuntus, Roger of Parma, and many other writers. Before their time, Celsus had indicated the urethral discharge, and called it *nimia profusio seminis*. Paul of Ægina attributed it to the presence of an ulcer in the urethra. To the same cause Actuarius refers the urethral discharge, and supposes it to proceed sometimes from ulcers in the urethra. Who can mistake urethritis in the expressions, *pudendorum putridines et fluxiones*, *pudenda fluxione laborantia*, used by so many ancient writers.

The accidents following neglected or mal-treated urethritis, such as strictures and urinary fistulæ, were known to physicians before the siege of Naples. Avicenna, Guido de Gauliaco, Valescus, and others justly looked upon these as a most dreadful form of ulcer. Celsus has described *orchitis*, that frequent concomitant of urethritis, and recommended the loss of blood and poultices for its cure. Hippocrates gives the remedies for ulcers, *putridines pudendorum*, and when treating of the diseases of women, speaks of ulcers on the genitals, and their mode of treatment. Oribasus speaks of ulcers on the sexual parts, and strongly recommends acetate of lead and oxide of zinc. Dioscorides gives the remedies for malignant ulcers of the *vulva*, and ulcerations of those parts. Scribonius, Largus, and Placitus Seretus propose remedies for the foul and cancerous ulcer of the genitals. Galen mentions ulcers of the testicles. Marcellus Empiricus speaks of *foul ulcers* and *chancres*. To these may be added many others who speak in similar terms, such as Buhahylyha, Byngellas, Mesue, Albucasis, etc.

The writers above quoted make but little mention of the source of the diseases about which they speak, and it may be inferred from thence that they were different from those now known of a syphilitic character; but we shall show by others, whom we shall adduce, that they were identical, both as regards their origin and nature, from the fact that these diseases were ascribed to commerce with diseased women. According to Moschion, *clavi* grew from the female genitals. He teaches how to treat ulcers of the penis and ulcers and fissures that occur in the vulva. Constantine, Africanus, Tortula, Petrus Hispanus, afterward known as Pope John XX, also treated of the ulcers of the genital organs, and external remedies for their cure. Gulielmus of Plaisance, describes the ulcers which occur around the prepuce from connection with a diseased woman or a public whore. Gulielmus de Salicetto, Professor of Surgery at Verona, about the middle of the thirteenth century, speaks clearly of the contagion of ulcers, corruptions, white or red pustules of the penis and prepuce, contracted with an impure woman, or with a public woman, and in other ways. He recommends rest, bloodletting, diet, the use of astringents, and even of the actual cautery. Guido de Gauliaco, physician of Pope Clement II and Urban V, at Avignon, mentions ulcers on the genitals, occurring from debauchery. John of Gadesden not only alludes to the possibility of contracting ulcers on the penis, but mentions the precautions to be used to avoid contagion. Gordon Arnaud de Villeneuve, Petru de Argelata, of Bologna, and Valescus of Tarentum, have described so accurately ulcers on the genitals, that it would be impossible to believe that they were not the same as now are known. Gulielmus Varignana, and Galeatus de Sancta Sophia, speak of tumors

and ulcers on the penis, and treat of *rhagades* and fissures supervening on excess of coition. John Michael Savonarola also describes ulcers on the sexual parts.

We have, we think, adduced sufficient authority from the ancients, not only to satisfy the most incredulous of the great antiquity of the disease, but of the causes which led to its origin, and the gradual progress of its development. In our investigation we have been more concerned in the collection of facts, than in any theoretical speculations, however plausible, believing that one well authenticated fact, in regard to the early existence of this disease, is of more value than tomes of speculation. Physicians of the sixteenth century and downward have singularly referred all the venereal diseases to the epedemic of Naples. Those who saw the Neapolitan disease speak of ulcers of the genital organs, without stating that these ulcers had any connection with that epedemic. The observation of ulcers on the genitals must have led to that of *phymosis* and *paraphymosis*. Galen has described both, and Celsus informs us how to remedy the former affection, which he terms *præputii clausum*.

Posthitis, so frequently complicated by balanitis and ulcerations, in men who have a natural phymosis, and in those whose glans are not really uncovered, was frequently observed by the ancient physicians and by those of the Middle Ages. If it were true that *buboes* were only known in 1532 or 1540, according to Marsa and Stobern, Fallopius would certainly have mentioned the appearance of these diseases, but he has not done so. They are described in Angelata, Gulielmus de Salicetto, Lanfranc, John of Arden, Theodori and others. We are not now speaking of the *plague bubo*, known to all antiquity, since almost all these authors derive it from the impression of the disease upon the sexual parts.

Many physicians have thought that the affection called *lues inguinaria* was syphilis, but this title belongs to the plague properly so called. The plague of 542, which, originating in Ethiopia, spread over Egypt, Syria, Asia Minor, Constantinople, and a part of Europe, in the reign of Justinian, and which, for a period of fifty-two years, desolated the countries over which it passed, was called *lues inguinaria* on account of the buboes which appeared in the groins. Gregory, of Tours, says it desolated Paris in 590.

According to M. Jourdain, the ancients never had the least idea of referring the origin of the secondary affections which they saw to the genital organs. When they supervened, they were attributed to the direct action of some external cause on the affected parts. They never employed internal remedies to correct the humors, although they admitted humoral diseases resembling our poisons.

When astrology ruled the opinions of the learned, the venereal

disease was attributed to a fatal influence of the stars. Some physicians, however, unwilling to credit the assertions of astrologers, thought to give it a more scientific origin, and ascribed it to some peculiar infection of the atmosphere. Fallopius, of Modena, assigns as its cause, poisons thrown into the wells by the Spaniards, or lime mixed with meal as food. Cesalpinus, and Aretinus, the physician of Clement VIII, attributed it to wine poisoned by the blood taken from the sick in the hospital of St. Lazarus. Phioravanti says that in the year 1496, during the war between Alphonsus, king of Aragon, and John the son of Regnier, Duke of Anjou, provisions being scarce, both in the Spanish and French camps, the butlers of both armies, through greediness of gain, secretly cut in pieces the dead bodies of the slain, and dressed them in different forms of food, which they sold to the hungry soldiers at a dear rate; and within a short time after, as many as had eaten of this dangerous meat, almost to a man, broke out in pustules, and were seized with severe pains, falling off of the hair, and in a word, with the venereal disease; and that the French who had contracted the disease, being obliged to quit the war and return home, named the illness they had contracted in the kingdom of Naples the *Neapolitan disease*, while the Spaniards and Italians, not knowing the cause of the disease under which they themselves suffered, called it the *French disease*, which name it bears to this day in Italy, along the coasts of Africa, in the Turkish empire, and in all parts of Asia bordering on the Mediterranean.

Van Helmont supposed it to have arisen from the circumstance of a man having had connection with a diseased beast. These and numerous other conjectures unnecessary to notice, because alike fanciful, have from time to time been indulged in, in reference to the origin of this loathsome disease; but its true and only origin is now traceable to connection with an infected woman, unless perhaps, as in a rare instance of inoculation, without such impure connection. As the Neapolitan disease, so termed by the French soldiers, and by the Spaniards called the French disease, prevailed in its greatest malignity about the time of the return of Columbus from the discovery of America, it was supposed by some to have been imported from the New World, and hence it was denominated the *American disease*. From all we can learn we are disposed to trace it to a higher origin, believing that it was communicated through the Jews, who had received it from the heathen nations, with whom they were in contact; or, perhaps, what is more likely, it came down like the leprosy, yet of older date, from the early progenitors of the race, as a judicial infliction for the sin of licentiousness.

The prophet and lawgiver of the Jews, in enumerating the evils that should come upon them on account of disobedience, says, "The Lord

shall smite thee with consumption, and with a fever, and with an inflammation, and with an extreme burning, and with the *emeroids in the secret parts*, and with the scab, and with the itch."

In the further prosecution of the history of this disease, we shall continue to adduce such historic testimony as we can have access to in the best works, both ancient and modern, extant. As we purpose a thorough investigation in both the history and treatment, we shall leave out nothing essential for the profession to know—always however, keeping in view the great principles of Eclecticism, thoroughly subjecting all theories and modes of practice to the test of practical demonstration. The ancient notions that the disease arose from an *earthquake*, or from the *malignity of the air*, caused by an overflow of the Tiber, or to the influence of the planets, or the malignant conjunction of Saturn and Mars in the sign Scorpio, or to the poison thrown in wells, or the poison of wine, or the eating of human flesh, have all been exploded as idle conjecture, and the true origin acknowledged by all is to be found only in *coitu cum fœda muliere aut meretrice*.

We have already intimated that the character of the disease was as unknown as its causes. It resembled the most direful diseases known to antiquity, and hence was compared to elephantiasis, leprosy and the itch, and the first names it received were those of *morbus pustularum*, *malæ pustulæ gæle pustuleuse*, or *pustular itch*. Gruenbeck called it *mentulagra*, Hock *mentagra*, Torilla *pudendgra*, Sebastian Brant, in 1496, *scorra pestilentialis*. It was afterward known to the people by the names of *gore*, *grande gore*, and *grosse verole;* to the Flemings and Picards, by that of *poque*, derived from poquette, signifying the small-pox. The Lombards named it the *French disease*, while the French in turn called it *la grosse verole*, *le mal Neapolitain*. From the Germans it received the name of *grosse blatten*, *die frauzosen*, *die frauzosischen pocken*, *morbus gallicus;* the English *French pox*, the Dutch *Spanche pocken;* the Spaniards called it *las baus*, *les bouels* or *las bubas;* the Indians *bao oura*, the Moors and Africans *morbus hispanicus*, the Portugese *morbus castellanus*, the Turks the disease of the Franks, the Persians the Turkish disease, the Russians the Polish disease, and the Savoyards *la clavela*. The French who brought back the disease from Naples facetiously called it a *souvenir*. Fallopius and Fernel designated it by the name of *lues venera*, and as already stated, in our introduction, Fracastorius invented the name of *syphilis*. Jacques de Bethencourt, in 1527, was the first who described it under the title of *venereal disease*, by which it is now so generally known.

From the above it will be seen that the disease has borne the cognomen of almost every country, and hence we may learn that it has

everywhere prevailed, and like the taint of human depravity, has everywhere connected itself with the race. From Sauval we learn that in the fourteenth century the venereal disease received the name of *pelada*, on account of the number of persons who were shaved clean without any razor.

In the year 1530, Fracastorius, in his *De Morbis Contagiosis*, writes thus:

"When it first broke out among us, it discovered itself by the following symptoms: the patient was less spirited, complained of weariness, and had a pale look; at last, for the most part, little ulcers appeared about the pudenda, which were extremely obstinate, and after they were cured in one part, broke out in another. Afterward a kind of crusty pustules appeared upon the skin, beginning in some parts upon the scalp (which was most frequently the case), and upon other parts in others. At first they were only small, but increased by degrees, in a short time, to the size of the husk of an acorn, and had a good deal the same appearance—not unlike those scabs which appear on the heads of boys. Of these scabs, there were several different kinds, some of them small and dry, others large and moist; some of a livid color, some of a palish-white, and some hard and reddish. All of them opened in a few days, and discharged a thick, fetid matter, nor is it possible to express what the quantity of that matter perpetually discharged was, nor how nasty it was in quality. Afterward the ulcerated parts became eroded in the same manner as those ulcers which are called phagedænica, and sometimes they infected not only the flesh, but likewise the very bones. When it attacked the head chiefly, it produced acrid rheums, which eroded sometimes the palate, sometimes the uvula, and sometimes the jaws and tonsils. In some it destroyed the lips, in others the nose, in others the eyes, and in others the whole pudenda. Beside this, the limbs, in a great many, were disfigured with gummy tumors, which frequently grew to the size of an egg, or a small loaf, and being laid open, discharged a white mucilaginous matter. That tough hardness appeared chiefly on the legs and arms, and sometimes became ulcerated—sometimes it continued entire until death. But beside all the above mentioned symptoms, as if they were only trifling, there occurred violent pains of the arms frequently, together with pustules, sometimes before, sometimes afterward, very obstinate and lasting, and excessively tormenting. They were most violent in the night, and the pain was not properly in the joints, but in the muscles and nerves. However, there were pustules sometimes without pains, and in some, pains without pustules, but the greater part were affected with both. In the meantime, all the limbs became feeble, the body emaciated, and the appetite quite lost. The patient had no sleep, but was either melancholy, or very irritable, with

a strong inclination to lying in bed. His face and legs swelled. Sometimes, though rarely, the disease was attended with a slight fever. Some had a pain in the head, which was lasting, and not to be subdued by any medicines."

During the following years, John de Vigo, Peter Maynard, Nicholas Massa, Fallopius, and others, make mention of the remaining symptoms, which are now almost universally recognized. Joannes Fernelius, in his work *De Abditis Rerum Causis*, says:

"On whatever part of the body the lues first settles, there fixing itself, it excites a pustule, and soon after, a small ulcer. Thence extending further, it fixes its roots, and sensibly penetrates the interior by a forced unceasing action; and in fine, unless you shall have opposed it by some remedial measures, it devastates and commits ravages on the whole body by its influence and virulence. From this, it is manifest that a certain poison constitutes the essence of the disease, creeping over or insinuating itself into the whole body, in no manner differing from the poison of the rabid dog or scorpion. The signs of it are various, depending on the nature of the parts over which it spreads. When the virus, for the sake of illustration, has its origin in copulation from the private parts, bedewed with moisture, it determimes first pustules in those parts which are very obstinate, and then small ulcers, which are difficult to treat, and of a very bad character. Then the vapor or effusion creeping inward by the hollow canal of the pudendum (for it is not credible that any humor or fluid enters it), it impoverishes the blood of the vena cava, and the spirit contained in the large artery, and then the bubo breaks out in the groin. Hence, a gonorrhea manifests itself from the diseased spermatic ducts and kidneys, by which this most foul virus is ejected as by belching. When this execrable disorder has invaded the liver and stomach, a slight abdominal flux breaks out, and soon after, the blood is infected with the liver, by which all the veins of the body become implicated, and in this manner disseminated in the limbs, muscles, and skin—it having been repulsed, breaks out silently, and worse than before. Livid and reddish pustules occur; ulcers covered with crusts and tetters; in some persons, excavated and malignant ulcers; and in bilious persons, phagedenic and corroding sores; in the melancholy temperament, cancerous ulcers; and in the phlegmatic, they are more superficial, but more foul, and discharging a fetid, mucous humor; and in sanguine persons, they are more thickly set, and resemble carbuncles. All, indeed, with very hard, indurated, tumid, and inverted edges, which ulcers, having eaten the flesh, feed upon the bones themselves; at first the thin bones, as, for instance, those of the palate and nose; then those of a more solid consistence, which, becoming putrid and carious, are thrown off. It follows, as a natural consequence, that

when the head is attacked, or the brain is the seat of the disease, many pituitous humors, disproportionate to the condition of the part, collect, which, if shut up in the head, produce severe and considerable pain; but if they point under the scalp, and should be determined toward the joints and limbs, they excite most dreadful and daily tortures, increased greatly at night, or they excite very hard *tophi* and tumors by no means free from pain. Although the matter appears pituitous, nevertheless, being impregnated with this deadly matter of poison, it partakes of its acrid properties. Thus hiding itself under the periosteum of the bones, it produces pain, both by its acrimony and by distension. Penetrating the substance of the bones, as it were, by minute tubes, it expands them, and dilates them into tumors, which bones at length, being attacked with caries, become putrid. If the matter, being less biting and acrid, does not destroy the skin, its malignity or noxious vapor being poured out around the hair, occasions, in the language of Fernel, an effluvium, on which account the greater part appear without hair on the head, eyebrows, or body. The hair, however, may be reproduced. But its effects are not confined to the external parts alone; they extend to the internal parts, affecting even the viscera which are found, as in exanthematous diseases, on dissection, covered with pustules and ulcers. Gruenbeck, who wrote in 1496, placed at the head of his book a wood-cut, to represent a corpse covered with pustules."

The writers of that early day touched but lightly on the diseases of the genital organs, inasmuch as we find that the skin, and particularly the face, appear to have been the parts chiefly affected by this disgusting malady. Why they should have omitted to describe the effects of syphilis on those organs more particularly and primarily affected by it, we are at a loss to determine. The following passage from the annals of the Franciscan friars does not mention diseases of the genitals, but gives ample proof of the fear and dread inspired by this epidemic:

"Anno 1489, Joannes Piccapridius Papiensis quavi febre et morbo gallico fædissimo quasi, lepri specie exarticulari et apos ternate et pruriente undequaque corporis commixto oppressus. Ab eadem et ferme uncurabili ægruetidine Paulinus de Rabeis ejusdem urbis post quam maguæ pustulæ per totum corpus erum peruit."

The author states that these two persons, and many others, were cured by making a pilgrimage to the tomb of St. Bernard! We might add, had they been more careful in paying their devotions to the shrine of St. Bernard than they were in paying their devotions to the shrine of Venus, they might have been saved from "*horrenda et ferma incurabili*," etc., as well as their fasts and pilgrimages.

Medical writers inform us, that after the venereal disease had raged

with great violence for several years, its severity abated in those places where it had spread such horror and desolation. As the dread it had inspired lessened, its connection with affections of the genital organs were more observed, and the various causes to which it had been referred lost their credit and value, while more rational, direct, and specific causes were sought for. This, however, occasioned the introduction of many new errors, some of which have not been eradicated to this day.

We are not, however, done with the history of this disease. In France, but more especially in Paris, in 1514, it raged with great severity; and this we learn, had we no other facts to sustain the declaration, from the nature of the parliamentary edicts enforced in regard to prostitution and the establishment of hospitals for the cure of diseases engendered thereby, throughout the city. At the same period, this hideous disease appeared in Switzerland, Cracovia, Germany, and the Low Countries. It spread over Italy in 1497, and visited England in 1498. According to Autenreith, it reached Wirtemberg not until a century after its introduction into the rest of Germany; and what is remarkable, with its invasion the leprosy disappeared.

In the year 1736, Astruc, physician to Louis XV, published his celebrated work on the venereal disease, and he is justly entitled to the credit of having written the most learned work of the day, and also of having treated the subject in a methodical manner. His book is divided into two parts. In the first part he describes the first stage or local venereal diseases; in the second part he treats of the second stage of the disease, or confirmed pox.

Under the first stage he includes:

1. Virulent gonorrhea and all its consequences.
2. Venereal buboes.
3. Chancres.
4. Verruca and condylomata.

Under the second, or confirmed pox, he describes:

1. Diseases of the genitals.
2. Diseases of the skin.
3. Diseases of the mouth and nose.
4. Venereal pains.
5. Diseases of the bones.
6. Glandular and lymphatic tumors.
7. Diseases of the eyes.
8. Diseases of the ears.
9. Disorders of the functions.

Astruc was decidedly of the opinion, that venereal diseases were not known in Europe previously to the year 1493, when he states they were brought into Spain by the followers of Columbus, after the dis-

covery of America. He quotes from cotemporary writers to prove his opinion, and he regarded the following places as the hotbeds of the *venereal virus*, namely: the kingdom of Peru, New Spain, Florida, the interior of Africa, the island of Java, the Moluccas, and China. He attributes the immediate source of the disease in those countries to the nature of the diet, immoderate promiscuous intercourse, and the virulent acrimony of the menstrual flux. He also says that it was communicated by sexual intercourse to the Spaniards, who imported it into Europe, from whence it spread among the Neapolitans. Soon after, he traces it among the French, who contracted it by lying with infected women at the siege of Naples, and it thence spread over the other countries of Europe.

In 1752, however, Sauchey wrote a book on the subject, in which he flatly contradicts the opinions of Astruc, and he shows most conclusively that the venereal disease was known in France long before the arrival of Columbus from the shores of the New World; that it was impossible for the Spanish army to have communicated the disease to the French troops, inasmuch as they did not come in contact with them at all; and lastly, that it raged in Italy in the beginning of the year 1493 as an epidemic. We have already shown that this scourge of nations has an existence which dates back to hoar antiquity, though we deem it proper, in writing a history of it, to give the various opinions which have been advanced with regard to its origin.

The illustrious Hunter, in his admirable work, written in 1774, teaches that the virus on which the venereal disease depends might affect the system in two modes—primarily or locally, and secondarily or constitutionally. By his experiments on inoculation, he has proven that such divisions existed, and that they might easily be distinguished. He taught that the primary effect of the venereal virus was twofold. When it came in contact with a mucous surface it produced gonorrhea, and when it was placed in apposition with the skin it produced chancres; and hence, in his classification of gonorrhea and syphilis, he makes them both the primary effects of one and the same virus. He called public attention to the induration which he believed always attended true primary sores, and did not consider as syphilitic such primary ulcerations as did not present such induration. He also taught that the venereal virus in either of its two primary forms could give rise to constitutional effects, a description of which he has given under the term *lues venera*.

In 1782, Benjamin Bell produced his experiments and reasons for separating gonorrhea from syphilis or chancre, and his views were afterward adopted and confirmed, in 1812, by Hernandez, of Toulon.

In 1815, the celebrated Broussais taught that syphilis is an irritation which affects the exterior of the body in the same way that scrofula

does, and that the physiological school of medicine ought only to note the form and degree of irritation in the different organs, and that it should alone occupy itself in means to oppose this irritation. Jourdain and Ricord, the pupils of Broussais, followed up the doctrine of their preceptor, and denied the existence of virus. "Call it what you will," said they, "but name it not virus." Practitioners of this school believe that venereal diseases depend upon simple inflammatory affections, resulting from the *mode* of the peculiar vitality of the organs primarily affected, and of their sympathetic power over certain parts of the economy.

In 1830, M. Ricord commenced his investigations on the causes and natural history of venereal diseases. The first result he arrived at was a conviction that a special cause, perfectly independent of the sexual organs, gave rise to and propagated syphilis. He attached a strict meaning to each term he employed, instead of that chaotic confusion which is found in so many preceding writers. Considering the term venereal disease in its most extended sense, he defines it to be all those affections which are more or less, directly or indirectly, the consequence of sexual intercourse, in whatever way affected. The various venereal diseases he divides into two orders, namely:

Order I contains diseases depending on common causes, independent of any special agent, reproducing themselves daily and under all possible conditions, consisting in simple affections—in a word, non-virulent. These he calls *syphiloid* diseases.

Order II contains diseases depending upon a special principle, distinct from all the ordinary morbific causes—affections which give rise to special effects called virulent. These he calls *syphilis*.

The second order has three distinct stages:

The first stage includes primary symptoms, which are the immediate effect of the morbific causes occurring on the spot where the virulent agent has been deposited; as, for example, chancre.

The second stage comprehends secondary symptoms, which are the consequences of absorption into the system of the virulent cause. They are hereditary, but not capable of transmission by inoculation. Example, certain affections of the skin and mucous membranes, iritis, etc.

The third stage comprises tertiary symptoms, not capable of being transmitted by inoculation, nor hereditary, but subject to pathological transformations and alterations of the submucous and subcutaneous, or of the fibrous or serous tissues.

We have thus taken a survey of the history of syphilis, from the earliest period of its appearance, with the various opinions entertained in regard to its nature from time to time.

Having in the preceding paragraphs given a history of syphilis, we

come now to consider its pathology and treatment. We have already seen that syphilis has three distinct stages, the first including what is denominated the *primary*, the second comprehending the *secondary*, and the third the *tertiary*. We have also seen that the first stage includes *primary* symptoms, which are the immediate effect of the morbific cause occurring on the spot where the *virulent* agent has been deposited; as, for example, chancres. The second stage comprehends the *secondary* symptoms, which are the consequence of the absorption of the *virulent* agent into the system. They are hereditary, but not capable of transmission by inoculation; for example, certain affections of the skin and mucous membranes, iritis, etc. The third stage comprises the *tertiary* symptoms not capable of being transmitted by inoculation, nor hereditary, but subject to pathological transformations and alterations of the submucous and subcutaneous, or of the fibrous or osseous tissues.

Pursuing the order laid down, we shall notice the primary symptoms belonging to the first stage, denominated chancre. The *seat* of this disease in the male generally occurs at the point of reflection, the *cul-de-sac* of the prepuce, on its edge, while in the female it is found external to the caruncular myrtiformes, near the fourchette. The cases are exceptional when it is observed on the lips, the anus, the nipples, and at different points on the skin, especially adjacent to the genital organs, where it is delicate and has undergone a kind of mucous transformation. Mr. MacCarthy, while one of the *internes* at the *Hospital du Midi*, collected the statistics of chancres found in extraordinary situations. Of these, one was observed in the nose, one on the gums, one on the tongue, three on the lip, two on the chin, four on the hand, two on the scrotum, fifteen on the anus, seventeen on the urethra, and three on the thigh.

Chancres are generally exposed to view, and are observed without difficulty. In this case they are called *patent*, to distinguish them from those more deeply seated in cavities and canals, which are termed *concealed*. We may here remark that this chancre denominated *larvæ* has been much abused. Its existence occasionally singularly obscured the theories entertained on syphilis. Moreover, there are concealed chancres which may be found, and there are those which are never discovered; the latter are the kind which are especially abused.

We may also remark, in regard to the seat of chancres, that while non-specific ulcerations are exceedingly common on the cervix uteri, chancres are rarely met with in this situation. Differences of seat and differences of tissue, give rise to differences of form, of aspect, and of other peculiarities which it is important to indicate. The tegumentary surface to which the virus is applied, may exist in two principal

conditions; there may be a solution of continuity, an ulceration or wound, or they may be intact. In the latter case, where the virus is applied on a surface more or less excited only, or where it is applied at the moment a solution of continuity of surface occurs, as for example, at the time of a rupture during coition, the same condition obtains as when a puncture is made for the purpose of inoculation. It is evident that when there is a solution of continuity, or when this occurs even at the moment of inoculation, certain local phenomena must always speedily become developed. These may not appear, or if they do, they appear at a later period, in cases where the surface of the integuments remains intact.

For the purpose of facilitating investigation, it may be noticed that there are three different periods or stages of chancre, viz: 1. That of the pustule; 2. That of ulceration; 3. That of cicatrization. Properly speaking, chancre is a suppurating wound. We shall consider it under the distinct stages enumerated.

First stage.—A distinction should always be made, and especially here, between experimental inoculation and physiological inoculation, or in other words, from true contagion. Experimental inoculation will almost certainly produce the pustule; it may be studied *de visu*. Physiological inoculation, on the contrary, will rarely afford us an opportunity of observing the pustule, if it be observed at all. We will first consider the effects of experimental inoculation. From the first day after the insertion of a small quantity of pus taken from a chancre, a red point is noticed where the puncture is made. On the second day, there is a slight elevation, then a pimple; soon after this there is a demi-turbid humor, then that which is completely turbid fills the little cavity. From the third to the fourth day, we find a vesicle, a pustule, or a bulla. At first there is a diffused redness around the puncture, this redness becomes circumscribed in proportion to the development of the pustule; an areola forms, furnishing us with evidence of the extent of skin about to be detached. If the pustule be not destroyed on the sixth day, its summit becomes flattened and is covered. Beneath the first scab another is discoverable, of a still larger size, and other layers exist which together represent a truncated cone surmounted by the first concretion. The surrounding tissues then become œdematous and indurated. If the pustule now be opened, there afterward may be discovered the signs of specific ulceration of chancre, as will hereafter be described. Such are the effects of experimental inoculation, when the lancet has penetrated a little deeply; they commence at the moment of the puncture, and occur without interruption. There are two things which occur—first a puncture or a wound, and second, the insertion of a virus, or in other

words, a poisoning. So much for the experimental pustule which is open to our view, as it may be made to form under our eyes.

The pustule of chancre does not always possess the same characteristics. It exists with or without depression in its center; its contents are more or less turbid; in fine, it presents the characters more or less of ecthyma, but these characters are not always identical; sometimes it is even a pemphigoid bulla, the diameters of which exceed those of the ulceration. If there exist no pathognomonic form of eruption, neither is there a characteristic pustule, the eruption moreover does not always follow the progress which I have described. If the pustule arising from experimental inoculation performed in a certain manner is most generally of easy detection, such is not the case with that from physiological inoculation, or in other words, from contagion. It does not follow, however, that ulceration is always absolutely the phenomenon first observed, for an abscess may precede a chancre. Thus the syphilitic virus may be absorbed by a mucous membrane, and be carried to a greater or less distance from the surface of application and absorption. An abscess may be there produced, and its opening by ulceration will be nothing more nor less than chancre.

Such is the condition of things in the case of primary syphilitic buboes. Practitioners have cauterized vesicles and pustules on their first appearance around the glans, but as these pimples were not pathognomonic, and as according to these practitioners we may confound the vesicles of acne and of herpes with the incipient pustule of chancre, we cannot therefore be sure that the latter is destroyed by cauterization.

In the treatment of chancre in the first stage, we remark that it should be both of a *local* and *constitutional* character; because, as above stated, it is often absorbed by the mucous membrane and developed at parts remote from the point of contact. As a local application, we have always found, from the commencement of our practice, a single agent sufficient to remove the disease. This agent is the muriated tincture of iron. Since the year 1841, we have never resorted to any other remedy than the one specified, with the exception of two cases in which we tried the nitrate of silver but without the success we have derived from tinct. iron We have, from the period above specified, invariably, with the exceptions noted, used this remedy.

As soon as the vesicle or pustule is discovered, let it be covered with the tincture, using a camel's hair pencil. The application should cover not only the entire surface of the pustule, but be extended from one-half to three-fourths of an inch from its base, bearing in mind, in all instances, that it is important to puncture the vesicle before the application is made, unless it is already open. The tincture should

be applied three times a day at least, and in sufficient quantity to fill the abraded surface. This mode of treatment should be continued for two days, during which time a cold water dressing should be applied. After this let there be an application of the mild zinc ointment to the entire surface, until the parts destroyed by the remedy have entirely sloughed off. This ointment should also be continued until the parts become cicatrized, which generally requires from five to ten days. In the meantime, however, if the base and edges of the ulcer become irregular and indurated, accompanied with a greenish, purulent discharge, it may be known that the chancre is not entirely destroyed, and requires a reapplication of the above treatment, which should be done as soon as the discovery is made.

We come now to notice the *constitutional* treatment, which may or may not be necessary, in this stage of the disease, and which can only be determined by subsequent development; but as it may be too late, should we wait for such indications, and it will not be productive of any injury to the system, it is well to employ it. In the first place, let an active cathartic be administered; for example, podophyllin, leptandrin, and apocynin. This dose to be repeated every four hours, *pro re nata*. As soon as this is accomplished, let the following compound be given:

℞ Com. syrup stillingia;
Iodide of potassium.

Let the surface be bathed night and morning freely with the alkaline-bath.

We come now to notice the *second stage*. To this stage belongs the chancre properly so called. The base of the chancre in this stage is irregular, appearing as if covered with little cells, and is of a yellowish gray color, more or less strongly marked. Its edges are perpendicular, and more or less indented and detached. A violet red circle surrounds the ulcer, the breadth of which is in proportion to the detachment. Generally this ulceration involves the whole thickness of the integuments, and the tissues immediately subjacent are more or less tumefied and indurated. Thus the base is more or less indurated, as are the edges of the ulcer; the tumefaction of the latter causes them to be inverted, and the ulcer is then of an infundibuliform shape. The ulcerated tissues are not only exposed, but are covered by a pseudo-membranous layer, the formation and reproduction of which takes place with the greatest rapidity. This false membrane has been regarded as the matrix, the secreting organ of the virulent pus. Chancres are of various dimensions, from the puncture scarcely visible, to an ulceration as large as a silver dollar. They are usually two or three in number, and when they exist in greater quantity, they are fol-

licular, and are very near to each other, either on the glans, the prepuce, or the vulva. The above described are the most common characteristics of the regular chancre, or those which are the most frequently observed.

Chancre is sometimes, at its commencement, the seat of pruritus which occasionally becomes very severe. It is the only modification of sensation, of which the patient complains; sometimes there is a real pain which may become so intense as to prevent the patient from sleeping, and require a modification in our treatment. This phenomenon is observed when chancres are concealed beneath a prepuce, with a narrow orifice, and in phagedenic chancres; but the pain is most frequently slight, and in some cases is felt only after some irritation, as from coition, which may lead to the detection of a chancre, of the existence of which the patient was before ignorant. The surface of a chancre is bathed with pus more or less sanious, sometimes bloody and mingled with organic detritus. This pus is alkaline and contains animalculæ, which, however, is not a peculiarity of chancrous pus. That which gives it its specific character is the syphilitic virus, which is regarded as the product of the false membrane covering the tissues denuded by the ulceration. If the chancre is seated on a mucous membrane, and not exposed to the contact of the air, this pus remains in a fluid state; but if seated on the skin and exposed to the air, it concretes, and the ulcer is covered with crusts.

Chancre is generally of slow progress, lasting sometimes from a month to several years, and during this long period may retain the power of reproduction. It is seldom if ever spontaneously cured.

In the treatment of the second stage, we would remark that it requires more attention than the first stage, inasmuch as the disease has been developed, and it is generally not until it has reached this stage that the practitioner is consulted. It is generally the opinion among writers on chancre, that local treatment in this stage of the disease is of little importance, but we think this conclusion is reached without due consideration, from the fact, that so long as the secretions are suffered to go on, so long will the virus be absorbed, and thus its power over the system will be increased and perpetuated; whereas, if local applications be made, as in the first stage, so much of the cause at least will be removed and the agency employed in the constitutional treatment be greatly assisted. Let the same treatment be observed, modifying it to suit the circumstances. It may be necessary, should the ulcerations become greatly enlarged to dilute the preparation to some extent, as the application to the original prescription may give to the patient too great pain; but we insist upon it, that unless some reason can be given of the want of value attending local applications in the treatment of the disease in this stage, they should not be abandoned,

nor should they be used merely for the purpose of healing the ulcer itself.

In reference to the constitutional treatment the same course should be pursued, so far as the surface is concerned. In addition to the remedies referred to in the first stage may be alternated irisin, stillingin, phytolacin, sanguinarin, leptandrin, podophyllin, etc., all of which we have found to be most excellent alteratives, especially in the treatment of this disease. In regard to the dose, together with the nature and properties of the concentrated medicines alluded to, we refer to the list found in Bickley's Positive Medical Agents. But whatever alterative may be relied upon, the state of the bowels and skin must never be neglected. The chancre, after having been destroyed by the remedies as before mentioned, should be dressed with the ointment until complete cicatrization has taken place. The above treatment we have found sufficient in all cases to eradicate the disease in a short time when vital organs are not involved.

Buboes, it may be proper here to remark, require some special attention. When they are first discovered, they present themselves as an indurated tumor, very painful and tender—so much so that even the patient is unable to bear the pressure of the clothes upon the parts affected. It is important that these should be discussed as soon as possible, to prevent suppuration, for which the tincture of iron or iodine has been found sufficient when properly applied to the surface. The application of fine salt saturated with turpentine or spirits of camphor, and the tincture of phytolaca when applied to the surface two or three times a day have proven highly beneficial.

Some cases of supposed bubo, which have been recently treated by Mr. Hilton, in Guy's Hospital, have well illustrated the efficiency of counter-irritation, as a means of procuring the absorption of pus. The application which Mr. Hilton employs is a solution of the nitrate of silver of the strength of one drachm to two of water, with the addition of about three drops of the strong nitric acid. This is painted freely into the skin over the inflamed gland. Its effect is to produce great soreness of the skin and much pain, which is generally followed by rapid diminution in the size of the enlargement. Mr. Hilton informs us that he has long used the remedy, and now considers the cases of bubo which require opening, as quite exceptions to the rule. In several, in order to afford proof that the fluid absorbed was really pus, it was examined by a grooved needle, prior to the treatment, the puncture being at once reclosed. Even in those instances in which ultimately it becomes necessary to make an external opening, great benefit in the limitation of the suppurative action, and the absorption of the surrounding hardness, results from the counter-irritant treatment. The plan is applicable to many other diseases besides glandular ab-

scesses; in fact, to almost all in which the absorption of recent inflammatory deposit, either purulent or fibrinous, is desired. We reported a case in the Medical Times and Gazette for December 17, 1853, page 629, in which it had been effectually used to remove an induration of tissues around the femoral artery, which had so obstructed the vessel, as to cause a tubular dilatation. Superficial abscesses in the cellular tissue may also be so treated. Chronic non-suppurated glandular enlargements and swellings of one or other lobes of the thyroid gland may also be made to diminish by it. It is probable that the nitrate of silver has no particular virtues beyond those of a severe counter-irritant, and might, were it wished, be substituted by other remedies, as, for instance, a caustic solution of iodine. It is, however, a very convenient, manageable and efficient means, which there is no motive for wishing changed. The substitution of nitric ether as a menstrum instead of water, would be a great improvement.

Should all these discutient means fail, as is often the case, especially if the tumors have commenced suppurating, let warm fomentations be applied for the purpose of promoting it. So soon as fluctuation is detected, let the tumor be punctured, that the pus may be discharged. The abscess should then be washed thoroughly with a weak solution of the sesqui-carbonate of potash, and apply a cold poultice of elm for a few days, after which let it be dressed with the ointment, not failing however to keep up the ablutions referred to above.

In speaking of the third stage of chancre, we remark, that when it is about to heal, it passes into the condition of a wound; that is to say, its virulent membrane gives place to an inodular cicatrizing membrane. It has long since been established, that the difference between an ulcer and a wound consists in the difference of the membrane secreting the humor which covers the two solutions of continuity. When this cicatrizing membrane appears, the edges of the ulcer, which are detached, sink and approach the base, the indentations of the borders disappear, and are replaced by fleshy granulations, resembling those in suppurating wounds. The violet-red circle is succeeded by an areola of a pearly-gray color. As the healing of the ulcer progresses, its circular form becomes changed and angular at several points of its circumference, because its edges are drawn inward, and in an unequal manner, by the inodular membrane which has replaced the lardaceous layer already mentioned in treating of the progress of chancre. The cicatrix which succeeds to chancre, like that of every solution of continuity with loss of substance, is shriveled and depressed—sometimes, instead of being depressed, it is, on the contrary, elevated like a honeycomb. On the mucous membrane, these marks at length completely disappear.

Whenever the healing process finally commences, its progress is

rapid, it being no longer a chancre or ulceration, but a wound. Cicatrization can never be regarded as complete so long as there is remaining a single point of the grayish base. This point may extend and become developed, and the chancre itself be renewed; or, to speak perhaps more correctly, it may become enlarged, and invade the cicatrized portion, and the adjacent integuments which were not before involved. When the cicatrization has once covered the whole solution of continuity, a return is no longer possible; before another chancre can appear, there must be a new inoculation. This is perfectly true, and accords with the views entertained by the best authors on this subject. It is important to note particularly this point in the history of chancre, that it may not be forgotten when a dicision is made in regard to the results of the inoculation of secondary accidents.

Two most important questions arise in the further discussion of this subject, in regard to *incubation* and *localization*. In reference to the former, the question is whether the syphilitic virus, when applied to our tissues, remains inert, or in a dormant state, during a certain period, to be afterward aroused, and produce effects which are apparent. We believe in the doctrine of incubation; that is to say, we believe that the venereal virus may remain, under certain circumstances, for some time entirely latent, at least without an appreciable effect. We were well acquainted with a case of this kind which came under our own observation—and the statement may be regarded as perfectly reliable—in which the disease did not develop itself for six months after coition, and when it made its appearance, it was developed and progressed so rapidly, that the whole system appeared as one mass of ulceration, which resulted in the entire destruction of the genital organs in a few days; and, notwithstanding the most active remedies were applied, his system was left a perfect wreck, in less than sixty days from the time the disease developed itself. At this time we have several similar cases under treatment, and they are not at all singular, as those engaged in the practice of the profession must know. In regard to this question, there is a difference of opinion among medical writers, the speculations of which are, however, not of sufficient importance to insert here. Our own opinion is the result of careful observation and experiment, and the reader must judge what is the true doctrine in relation to this subject.

The other question to which we alluded in this connection, is whether chancre is an entirely local affection; or, more specifically speaking, are the effects of the virus at first confined to the locality to which it is applied? On this subject great uncertainty exists, nor does experiment remove that uncertainty. After the destruction of the chancre by cauterization, and its conversion into a simple wound, cica-

trization takes place, and it has been stated, that after the lapse of four, five, and six days, the ulcer is not reproduced.

Now, there are chancres which, even if destroyed at the earliest period mentioned, are nevertheless reproduced in the same place. Of this we may be convinced by the fact that cauterization has not always succeeded in destroying the effects of inoculation. Beside, the complete disappearance is but a part of the proof of the limitation of the effects of the virus. To be absolutely certain that its action had not extended further, that it has not infected the system, we must watch the patient for a long time, and see that the accidents do not occur which are denominated constitutional. Numerous observations prove that chancres which have been speedily and entirely cicatrized, have, after a time, been followed by secondary accidents; and it is now the well-established opinion of the profession, that when chancre has formed, infection may have already taken place.

Admitting the localization of chancre, it may be asked, what are its limits? Is it confined in its action to the ulcerated, indurated tissues—in short, to the anatomical lesions? or does it extend to those which at least apparently retain their normal structure? To these questions no positive answer has been given. We would remark here, in passing, that those surgeons who at first cauterized the pustule with the nitrate of silver, now resort to a more powerful caustic, and one which acts to a greater depth. Why, it may be asked, this change in the treatment? Evidently because the caustic first used by them failed, and that in more than one instance; moreover, the operation of circumcision, when chancre exists, has more than once furnished proof of the possible infection of tissues apparently sound, and at a certain distance from the chancre. Sometimes, indeed, excision has been made almost an inch below chancres, on the edge of the prepuce, and the skin, mucous membrane, and cellular tissue, have been found in an entirely healthy condition, and yet the wound made by the incision has become a vast chancre.

Believing, as we do, in the physiological absorption of the virus, or, in other words, absorption without previous ulceration at the point where the virus is applied, we are inclined to admit the doctrine of incubation, and facts show this incubation to be real. Our observation and experience also lead us to adopt the doctrine of *non-localization*. We do not think that for a certain period, the effects of the virus are limited to the narrow sphere of a chancre. We believe that a recently-developed chancre, which already secretes a virus capable of inoculation, will at the same time produce that which is capable of absorption.

In certain conditions of the surface, when it is much excited, or there is an excoriation, a wound or puncture made for experimental

inoculation, local phenomena are speedily developed, which are represented by a pustule or otherwise. But these local effects do not prevent those of a general character.

Thus far we have considered the regular chancre, and pointed out the characteristics by which it may be distinguished. We have also alluded to the differences depending on the seat and nature of the tissues affected—differences which may mask the ulceration and change its form. We shall now call attention to the varieties, the deviations of the primary ulcer, which are sufficiently marked to be separately described.

The first variety we shall notice is that of *phagedenic chancre.* The progress of the phagedenic affection is not always uniform, and its characters may vary, by which sub-varieties are constituted. There are chancres, the ravages of which extend almost equally around the center which is their starting point; when cicatrization commences it is observed at all these points. On the other hand, there are phagedenic chancres which describe circles and demicircles, which festoon a region, which have in fine a serpiginous progress; we then see cicatrization going on at one point and the ulceration at another.

The first sub-variety we shall describe is denominated the *gangrenous* chancre. Ulceration being but a form of gangrene, all chancres may be regarded as gangrenous, but in ordinary chancre the gangrene is molecular, while in the so called gangrenous chancre, there are notable portions of tissue, of greater or less extent, involved; for example, fragments of the prepuce, a part of the penis, etc., and hence it is the gangrene of small portions.

The second sub-variety is termed the *diptheritic* or *pultaceous* chancre. This is most frequently observed in aged and feeble subjects, in children who are placed in unfavorable hygenic conditions, and in persons debilitated by a bad regimen or an improperly managed mercurial treatment.

This form of ulceration bears the most striking analogy to the hospital gangrene; the chancre is in fact complicated with this kind of gangrene. The base of the ulcer is yellow, with points more deeply colored and which bleed. It is tomentose, fretted and jagged; the surrounding tissues and the base are thickened and indurated. The skin is of a vinous red color and detached, for the destruction of the cellular tissue precedes that of the integuments. The skin afterward subsides, becomes perforated and finally suffers the fate of the cellular tissue. The parts in which the purulent or rather sanious matter accumulates are those in which the destruction is most complete; those become distended with organic detritus. We have seen pultaceous chancre of the prepuce destroy the entire tegumentary covering of the penis even in the scrotum. In attempting to wash the

base of such an ulcer, it bleeds, and we remove the portions of false membrane by which it is covered.

Under the influence of this form of syphilitic ulceration, the patient experiences hot and stinging sensations, with severe pruritus; he is, as it were, conscious of the destruction going on within him. When the nerves become exposed by the gangrene, then the patient suffers all the tortures of neuralgia. There is a low grade of fever, and an emaciation follows which ruins the constitution. The system sometimes resists until entire regions are laid bare, as for example, the whole inguinal region, a part of the thigh, and sometimes of both thighs.

The third sub-variety is denominated the *serpiginous* chancre. Instead of starting from a single point, like the preceding variety, and extending more or less circularly, encroaching upon the tissues which offer the least resistance, the serpiginous chancre follows circles, or portions of circles, more or less regular, like certain consecutive ulcerations, as the serpiginous syphilida. When cicatrization resists its progress on the one part, the chancre gains on the other. It may then be compared to a creeping plant. Sometimes cicatrization begins in the center, and the ulceration is observed at its circumference, so that in the middle of the ulcer there is an inodular disk which always increases in size, while the borders become likewise more evacuated and enlarged.

The serpiginous chancre most frequently coincides with the tubercular diathesis and the dartrous vice. Sometimes the tubercular condition is not manifested among the antecedents of serpiginous chancre, but only at an advanced period of the disease.

In the three sub-varieties we have enumerated, two are very clearly capable of inoculation, viz: the diptheritic and the serpiginous; such, however, is not the case with gangrenous chancre.

In regard to *indurated* chancre, or in other words, that deposition of plastic lymph beneath and around the ulcer which gives to the chancre its peculiarity, it is an inseparable feature in this disease, and even precedes, in some instances, ulceration. Specific ulceration, called chancre, is, in all cases, more or less indurated. We will call attention to some of the characteristics of indurated chancre. The induration represents a demi-sphere, or the base of a split pea, and this peculiar basis of the ulcer depends upon an effusion of plastic lymph, and has almost a fibro-cartilaginous consistence, and a certain elasticity which, once observed, is never forgotten. The surrounding tissues retain their normal color and consistence, participating not the least in the chancrous induration which ceases abruptly, the boundary of which is a projecting border that sometimes curls over under the corona glandis. Again, the indurated chancre secretes little matter,

it is not always of a circular form, and occasionally a portion of its border projects and forms a crest. Chancre does not indurate until the fifth day, and ordinarily a week intervenes before such induration takes place.

This form of chancre is observed more frequently in the male than in the female. It may be complicated with inflammation, and even with gangrene. When the latter occurs it is central, the inflammation appears to have invaded the indurated portion; it seems to produce strangulation and like all inflammations of this kind, when left to itself, terminates in gangrene. Thus we observe eschars occurring in indurated chancres, which, sooner or later, separate.

Thirdly, the *raised chancre* (*ulcus elevatum*). The base of this chancre is raised by a kind of vegetation of the form of a round or oval basin, of a fungous nature, and more or less raised above the skin. These chancres occur frequently on the edge of the prepuce; they furnish a sero-purulent matter, not generally painful, and their borders and base are but slightly indurated. When cicatrization takes place, it still remains above the level of the skin, a whitened projection, which is slow in disappearing. The cicatrix, after a while, sinks to a level with the surrounding parts.

If we reflect upon the different forms of chancre which we have described under the head of *varieties*, we find that they are the result of complications. Thus the first variety is complicated with gangrene; another form, viz: *diptheritic* with hospital gangrene; while the indurated *serpiginous* variety is connected with the tubercular diathesis. The raised chancre depends greatly upon the locality; it assumes this form when it is seated on loose cellular tissue, as, for instance, on the prepuce.

Having presented our readers with the history of chancre, embracing the three stages of its progress with the characteristics thereof, and having already given the treatment of the primary and secondary stages, we now come to the treatment of the tertiary stage.

In treating the first form or variety, namely, the *phagedenic* or *diptheritic*, as there is much inflammation attended with great irritability of the parts affected, the patient should be placed in a recumbent position, and an application of elm poultice, made with cold water, three times a day. This should be repeated for three days successively, after which the parts should be well washed in tepid water. The mild zinc ointment should then be applied, alternating with washing, to be continued for three days; after which time there should be an application of pulv. sulp. zinc, pulv. hydras., and hyoscyamin. The entire ulcer and edges should be covered with this preparation. The above application should be made once a day, covering it with the zinc ointment to prevent the powder from being rubbed off. The

application should be continued for three days, after which the ointment alone may be applied until the eschar sloughs off, and the ulcer is completely healed. It will be seen by this treatment, that the first object to be gained is the removal of the inflammation, as without this the removal of the ulcer is attended with great difficulty.

In the treatment of the *indurated* form of chancre, we observe the same course as that prescribed above, with the exception of that part of it which relates to the reduction of the inflammation. The same may be said of the other forms, the practitioner varying the treatment to suit the circumstances of the case.

In addition to the above external treatment, we recommend the use of a solution of sesquicarbonate of potash, increasing or diminishing the strength as occasion may require, having reference to the susceptibility of the parts.

As regards the constitutional treatment, whether there be chancres, ulcers, or blotches upon the surface, and whether there be few or many, we would recommend the same alterative course of treatment already indicated. The treatment to be continued, with the occasional use of the vapor-bath, acidulated drinks, and the saline bath—reference being had, throughout the whole course of treatment, to the peculiar constitution and temperament of the patient.

Except those engaged in a large city practice, very few have any conception of the extent to which we have been poisoned by syphilis. Syphilis, rum, and tobacco are literally destroying us: yet harlotry, inebriation, and nicotinization find warm advocates even in the medical profession. Rum, in its myriad forms, is undermining the intellects of our people and brutalizing our civilization; it is sapping our piety, debasing our morality, and endangering our national existence. Tobacco is stupifying our brains, discoloring our skins, poisoning our blood, vitiating our digestion, weakening all the external senses, and rendering us disgusting in our habits. But syphilis, with its thousand ills is burying itself in our vitals; it is sapping the sources of life, destroying our beauty, our vigor, and our manhood; far and wide it is sowing broadcast the fangs of death; it is mingling with our blood and complicating our diseases.

Were this taint confined to a generation we might be excused, but this transgression, or that which causes the contraction of syphilis, is truly visited upon the children unto "the third and fourth generation" of those who disobey. So generally has the poison been sown, that were it erased from the race, more than a third, or perhaps more than half our diseases would at once disappear. The disease is generated in filth, and it ends in the most loathsome of conditions.

The sights which I have seen, of ulcers, etc., resulting from this poison might well awaken the greatest attention. But as terrible as is

the disease, the former practice for its cure added to its terrors. While the syphilitic poison was incapable of producing caries of the bones, mercury, with its numerous abuses, and irritating properties, joined with the poison of pox, has been seen to melt away the bones of the face, and even of the skull. The skin is covered with scabs, the hair falls off, the voice is lost or changed, the sight impaired, the joints anchylosed and filled with rheumatic pains, the muscles shrink, and the whole man passes down rapidly to the grave! not, however, until he has left the poison deposited in the embryo type of himself—not until the mother of his children has been diseased, and made to mourn the death of her children filled with sores, and a variety of diseases which she believes to depend upon some scrofulous taint over which she has had no control. Surely some steps should be taken to stop this horrible ill. Young men should be taught the consequences of not guarding against the disease, and how to avoid it—for a little precaution and knowledge is all that is required. If some specific could be found for its total destruction, we might be less careful, but since we have to depend upon a long course of alteratives to free the system of it, and since so few are willing to undergo this tedious plan, the most we can do is to recommend the means of prevention.

These are perfect cleanliness, abstinence from congressional excess, and the invariable use of water and soap thereafter.—R. S. N.]

BUBO.

The irritation of a sore on the genitals, of whatever kind, or wherever situated, especially if aggravated by exercise or intemperance, is very apt to occasion swelling and inflammation of the inguinal glands. The buboes thus produced differ in no respect, so far as regards their treatment, from those which owe their origin to other sources; and an erroneous opinion, that formerly led to the most mischievous consequences, namely, that when caused by chancres, they were tainted with the syphilitic poison, and required a course of mercury for its removal, is now happily exploded. The mercury which under this idea used to be constantly prescribed in their treatment, by exciting fever and increasing the irritability of the system, often occasioned the most destructive phagedenic or sloughing effects, and when less obviously injurious, rendered the ulcers that resulted form the buboes extremely obstinate, and sometimes almost incurable.

Instead of thus encouraging the irritation, the object should be to sooth and allay it as much as possible. Whenever the patient begins to feel pain in his groin, he should desist from walking, assume the horizontal posture, and foment the parts two or three times a day, with warm water. When swelling is perceived, leeches are usually applied; and certainly almost always with the effect, in the first instance, of

lessening the tumor and diminishing the redness. But there seems to be good reason for thinking, that the local abstraction of blood is apt to render the morbid process more slow and obstinate, so that the patient suffers much more than if the disease had not been thus retarded. Warm fomentations, cathartics, and above all, healing of the sores, are the most effectual means for resolving the inflammation; while, if suppuration does take place, these means are conducive to its speedy and perfect accomplishment. If the swelling proves very indolent, blisters and tartrate of antimony ointment are often very useful in effecting its discussion, or hastening suppuration, if it is in progress; and it not unfrequently happens, that these means excite absorption of the pus even after it is distinctly perceptible by fluctuation, which is always very desirable, as a breach of the integuments ought, if possible, to be avoided in persons in whom the sluggishness of local action indicates a bad constitution. When the matter is fully formed, it should be evacuated by free incision, after which the cavity may be poulticed for a few days, and then dressed with a metallic wash. Should the surface present an unsound appearance, caustic potass ought to be employed for its destruction. If the glandular structure protrudes through the aperture or rises above the bottom of the cavity in spongy-looking, ash-colored masses, the whole of it must be either subjected to the action of the caustic, or first be removed in part by the knife or scissors. Should sinuses exist, owing to the aperture being too small or unfavorably situated, they are to be laid fairly open. In patients of feeble constitution, starvation and confinement are often the sources of obstinacy in the resulting ulcer, and must be obviated by an alteration of regimen. If the system has been injured by mercury, the cure is sometimes rendered extremely tedious. In such cases, the gradual restoration of healthy action, which takes place through time, together with the external application of caustic, black-wash, or sulphate of zinc lotion, may be confided in as the best means of promoting recovery. When buboes present a phagedenic or sloughing character, they must be treated on the same principles as sores of the penis in similar circumstances.

PHYMOSIS.

By Phymosis is understood a condition of the prepuce, in which it cannot be drawn back, so as to expose the glans. This condition may be either permanent or temporary; in the former case depending on the small size of the orifice, and in the latter resulting from swelling of the prepuce or parts contained within it. Permanent narrowness of the opening may be either congenital, or caused by the contraction that occurs during the cicatrization of ulcers. It is inconvenient on many accounts; and in particular, exposes the individual to an aggra-

vated form of all the diseases which affect the parts concerned. The temporary phymosis is a very common consequence of gonorrhea, sores on the inner surface of the prepuce, and warts. The swelling is attended with redness and pain, and is not only distressing in this way, but reacts on the disease which occasioned it, and renders the symptoms more severe, as well as the treatment more difficult.

The treatment of permanent phymosis requires dilatation of the orifice by incision, and this may be effected in various ways. Circumcision, or the removal of the extremity of the prepuce with a knife or scissors, is easily performed, but allows an extensive separation of the skin or mucous lining of the prepuce, unless a number of stitches are introduced all the way round, in which case erections of the penis are apt to excite great irritation. It sometimes happens, particularly in advanced age, that the prepuce becomes greatly elongated, thickened, and hardened, and then this mode of proceeding is the best, indeed the only one practicable. In ordinary circumstances, a better plan is to slit open the prepuce, simply inserting one stitch at the termination of the incision, which should be nearly at the neck of the glans, to prevent separation of the cut edges. The unseemly flaps that are thus formed in the first instance, soon suffer a diminution from interstitial absorption, which renders them hardly perceptible. The operation is most easily performed by means of scissors; and the best situation for cutting is in the mesial plane on the lower surface. Cold applications should be used for forty-eight hours, during which, and for a day or two longer, if necessary, the patient must be subjected to the antiphlogistic regimen. Dr. Dieffenbach, of Berlin, proposed a method of curing phymosis without depriving the glans of a preputial covering. This proposal is grounded on the fact, that the skin of the prepuce is always sufficiently wide, and that the contraction depends entirely upon the internal membrane. If, therefore, a circular ring be removed from the orifice, the skin may be drawn back so as to expose the glans covered by the mucous membrane, and this investment may then be cut away with the scissors as far back as seems necessary, after which nothing remains to be done but to connect, by means of sutures, the two cut edges of the external and internal membranes. The great objection to this ingenious operation is the risk of irritation, and tearing asunder of the edges of the wound by erection of the organ, as in this case the contraction, consequent upon cicatrization of the extensive ulcerated surface that remains, must inevitably lead to reproduction of the phymosis. The best operation, on the whole, seems to consist in cutting off a circular ring-like portion from the extremity of the prepuce, drawing back the loose external skin, then slitting the internal membrane as far back as the neck of the glans, separating the cut edges so as to bring them into

a straight line, and lastly, stitching them to the circumference of the skin.

The temporary form of this disease requires soothing measures, to allay the inflammation on which it immediately depends. Rest, warm fomentations, and if the symptoms are very acute, general depletion, together with leeches or scarifications, are the most effectual means for this purpose. If sores exist, they must be treated according to the principles already explained; and the operation for phymosis ought not to be performed to bring them into view, even though the contraction may have existed in a permanent form previous to their production. In this case the prepuce ought to be restored to its ordinary state before being laid open, as the cure will thus be completed in a few days instead of weeks, which would probably be required if the incision were made during the diseased condition of the parts. Nevertheless, if the sores prove very obstinate or irritable, this inconvenience must be encountered; but a careful and patient trial should always in the first instance be given to those means that are calculated to supersede the necessity of an operation. When the phymosis depends upon, or is connected with warts, the prepuce should, without delay, be slit open, as these excrescences cannot be removed so long as it remains contracted. It sometimes happens, in consequence of phymosis being associated with an ulcerated state of the respective surfaces of the glans and prepuce, that adhesion takes place between them. Attempts have been made to remedy this preternatural connection by dissection and careful interposition of dressings; but this procedure, which is extremely painful, hardly does any good, as the strong tendency to contract during cicatrization reduces the parts nearly to the same state in which they were previously to the operation. In such cases, however, it is found advantageous to slit open the prepuce as far as it is not adherent to the glans.

PARAPHYMOSIS.

In Paraphymosis the orifice of the prepuce is drawn back behind the glans, and causes compression or strangulation of its neck. This can happen only where the opening is narrow, without being so much so as to occasion complete phymosis. The narrowest part of the prepuce is just at the orifice, where the skin and mucous membrane meet; and when it is drawn back so as to denude the glans, the internal lining is apt to protrude more or less beyond the ring thus formed, so that the seat of the stricture is not exactly behind the neck of the glans, but separated from it by a circular swelling caused by distension of the protruded internal membrane. A penis suffering from paraphymosis thus presents anteriorly the point of the glans in a tumid state—then a circular swelling of mucous membrane—next a

deep sulcus, at the bottom of which is seated the stricture, formed by the narrow orifice of the prepuce—and lastly, the integuments of the penis more or less swollen, constituting a third enlargement nearer the pubis. Paraphymosis occurs at all ages, but most frequently in boys. It is readily recognized by the appearances which have been described, and the symptoms it occasions by impeding the circulation. These are, in addition to the swelling, pain, and the other indications of inflammation, which, in circumstances favorable to intensity of action, may terminate in sloughing, but more frequently proves its own cure, by inducing ulceration at the seat of stricture.

The treatment obviously requires the use of means proper for effecting reduction of the strictured glans, and the manipulation for this purpose should be conducted on the same principles as those of the taxis for hernia. The surgeon having anointed the glans with oil, embraces it between the points of the thumb and fingers of his right hand, while with those of the left he makes counter-pressure on the constricting ring. He gently but steadily compresses the glans for some minutes, and then, by a combination of pushing and rotation, he endeavors to press the neck of the glans within the stricture. If this proceeding fails, which it very seldom does when properly executed, he separates the swellings on each side of the stricture by bending down the extremity of the penis, so as to bring the tense cord-like portion of the skin which constitutes it into view; and then, with a sharp-pointed curved knife, makes a small incision at the part, about a line in length and depth. The reduction is now readily effected, unless the parts should have become consolidated by adhesive effusion, in consequence of the disease having been permitted to exist a number of days, in which case, just as in hernial protrusions that prove irreducible after the stricture has been divided, the completion of the operation must be trusted to the gradual effects of that tendency to reparation, which is exerted by the system. The penis should be enveloped in lint moistened with acetate of lead lotion, and the patient ought to maintain the horizontal posture, until the parts resume their natural condition.

CANCER OF THE PENIS.

The penis, is sometimes, but very rarely, the seat of cancer. Ulcers on it often assume the most alarming appearance, and exhibit extreme indisposition to heal, in consequence of constitutional peculiarities, especially that induced by the prejudicial use of mercury; but such sores must be carefully distinguished from those of a truly carcinomatous nature. The latter are only met with in persons of advanced age. They are characterized by the inequality of their surface, the cartilaginous hardness of their base, their fetid discharge, and lancinating pain. The inguinal and iliac glands become affected in the

progress of the disease, and the patient dies hectic from continued irritation.

The only remedy that affords any prospect of a radical cure is removal of the morbid part, and this, of course, only when the glands are untainted. The operation, therefore, ought to be performed without delay, as soon as the disease is distinctly recognized to be of this malignant kind. The penis may be amputated without any ceremony—care only being taken that the whole of the disease is taken away, together with a portion of the neighboring sound tissues. The integuments are more apt to prove redundant than defective, and therefore need not be saved by drawing them back previous to division. The arteries that require ligatures are to be tied, and the oozing of blood may be restrained by the application of cold water, or by effecting pressure on the stump after a flexible catheter has been introduced into the bladder. Should the orifice of the urethra threaten to contract during the cure, a bougie must be introduced occasionally to preserve its proper width.

DISEASES OF THE TESTICLE — INFLAMMATION OR HERNIA HUMORALIS.

The Testicle is excited to inflame by a variety of circumstances, of which the most important, in respect to their effect or frequency, are bruises, wounds, gonorrheal inflammation, either spreading back along the continuous surface between the urethra and testicle, or suddenly suffering a metastasis to the latter situation, and the irritation proceeding from strictures, or the means employed to cure them. The symptoms are pain, hardness, and swelling, with more or less redness; and in acute cases, there is not only feverish disturbance of the system, but also sickness, vomiting, and constipation, similar to those attending strangulated hernia, in consequence of the testicle being connected, in its sympathies, with the viscera of the abdomen. When the inflammation is intense, it may prove fatal; but, in general, it is merely productive of temporary distress, and exposes the patient to the risk of serous effusion, chronic enlargement, and alteration of structure, which are frequently its consequences. The most violent cases met with are those caused by wounds of the gland; and such injuries are, therefore, regarded as dangerous, particularly in irritable constitutions.

The treatment of inflamed testicle must be regulated by the circumstances of the case. If there is redness of the skin, and other indications of acute action, blood should be abstracted locally, either by applying leeches, or opening some of the veins of the scrotum with a lancet. If the latter mode is chosen, the patient should stand erect while the veins are punctured, and as long as it is desired that the blood should flow. Warm fomentations applied to the scrotum,

emollient injections thrown into the rectum, occasional doses of castor oil, and a strict antiphlogistic regimen, are the other means of most use, and, when the symptoms are very severe, should all be administered, together with tartrate of antimony and opiates, to allay the tendency to excessive action. Injections of tobacco infusion into the rectum have also been found beneficial. In mild cases, it is generally sufficient to evacuate the bowels freely, enjoin rest in the horizontal posture, and apply a lotion of acetate of lead with opium to the scrotum. After the pain and tenderness have subsided, a degree of swelling frequently remains, for which gentle frictions, with camphorated mercurial ointment, or other discutient applications, should be employed, but with due caution, so as not to occasion a relapse, by producing too much irritation.

[It is hardly necessary to point out the objections which I must urge against a part of this treatment. The rest, horizontal posture, and sedative applications are proper—to which I may add fomentations of hyoscyamus and veratrum viride. Keep the parts well bathed in water, give an occasional mild cathartic and quinine or cornine internally, and set up irritation in some other locality, by the use of our common irritating plaster. These means will be sufficient for arresting the worst cases; and arrested it *must* be; for if allowed to progress, it may speedily prove fatal. When the urgency of the symptoms have subsided, then try to remove the cause, if it depends on any other than a wound.—R. S. N.]

HYDROCELE.

By Hydrocele is understood an accumulation of serous fluid in the cavity of the *tunica vaginalis*, either occupying its whole extent, or confined to the part covering the spermatic cord. In the former case, which is by far the most common, the swelling has generally a pyramidal figure, the large extremity being downward; is devoid of pain and sensibility, except at the lower and back part where the testicle lies; appears translucent when placed between the eye and a candle in a dark chamber; and is felt to fluctuate when pressed between the fingers alternately. In hydroceles of old standing and large size, the *tunica vaginalis* often becomes distended to an equal size quite up to the external ring, and so thickened, that no translucency can be perceived. The fluctuation, insensibility to pressure except in the region of the testicle, and the history of the case, are then the only diagnostics from a swelling of the gland; and, if they should leave any doubt, it can be removed by a puncture. From hernia, hydrocele may always be certainly distinguished by pressing the neck of the tumor between the fingers. In hydrocele of the cord, as collections of fluid in this situation are named, the swelling is usually round or oval, fluctuating and translucent, leaving the testicle quite distinct, so that it may be

felt on all sides. It is sometimes associated with the other form of the disease, and can then hardly be recognized except by evacuating one or other of the sacs.

The origin of hydrocele may sometimes be referred to blows, or other sources of irritation, but is, in general, very obscure. The existence of a predisposition to the disease is rendered probable by the fact, that the fluid sometimes collects first on one side, and then, perhaps, after an interval of many years, appears on the other. The complaint generally commences about middle age, but is met with at all periods of life. Infants sometimes labor under it, either in consequence of the *tunica vaginalis* continuing to communicate with the cavity of the abdomen, and allowing fluid effused there to descend into it—a condition that has also, though very rarely, been observed in the adult—or simply effusion from some source of irritation often not observable.

The treatment of the disease is either palliative or radical. The former consists in merely drawing off the fluid ; the latter in doing so, and, at the same time preventing its reaccumulation. The paracentesis, or tapping of a hydrocele, is best performed with a small trocar, which should be introduced at the anterior surface, about a third of the length of the tumor from the bottom, and at an equal distance from both sides. There is here least risk of wounding any large vessels, and the greatest separation of the *tunica vaginalis* from the testicle, to avoid which more effectually the instrument ought to be pushed gently and steadily through the parietes of the swelling, while they are held tight with the left hand embracing it, and directed not perpendicularly to the surface, but obliquely upward. As the testicle is not by any means constant in its position relatively to the swelling, and as the *tunica vaginalis* is liable to partial thickenings, which would very much oppose the free introduction of the trocar, the operator should never proceed to puncture until he has examined the parts, and satisfied himself that there is no obstacle in the way of the instrument. This simple operation is proper in cases where it is not certain that the water will be again collected, and when the state of the patient's constitution, from age or other circumstances, renders it imprudent to excite any more than the most gentle irritation. It ought always to be performed before the radical cure is attempted, when the swelling is very large, or when it is necessary to ascertain, by examining more accurately than can be done while the water still remains, that the condition of the testicle is not opposed to the success of the operation required for this purpose.

Various methods have been employed for effecting the permanent cure of hydrocele. Of these the following may be mentioned : Incision, Excision, Caustic, Seton, and Injection. The last of these is now almost universally preferred, and it will, therefore, be sufficient to

notice the others very shortly. Incision, which is the most ancient practice, consisted in laying the cavity of the distended *tunica vaginalis* freely open, and inducing its obliteration by the granulating process. Inflammation and constitutional disturbance were the necessary consequences of this operation, and not unfrequently proved so violent as to occasion gangrene and death. The plan of Excision, though of very old origin, was chiefly practiced in the latter part of the last century. It consisted in cutting away an elliptical portion of the integuments, together with the whole of the *tunica vaginalis*, where not adherent to the testicle and cord. This operation, though more tedious and painful in its execution than the former, occasioned less severe consequences, and was followed by a more speedy cure, owing to the serous tissue being in great part removed. The Caustic was applied in the same way as for making an issue. The aperture caused by it could not of course heal by the first intention, and necessarily excited suppuration of the whole surface, which then gradually contracted like that of an ordinary abscess. This practice was employed during the last century, though not unfrequently attended with serious accidents in irritable constitutions. The Seton was applied to this purpose by Guy de Chauliac, in the fourteenth century, and is mentioned by Fallopius, Paré, and others, but was never very extensively used, either then or in more recent times. P. Pott strongly recommended it, and has given a very particular description of the mode of performing the operation. The essential part of it is the introduction of a skein of silk or cotton through the parietes of the swelling in its long direction. Inflammation and suppuration follow, and at the end of a fortnight, the seton being withdrawn, the cure is soon completed. Notwithstanding all the precautions that can be used, the irritation thus excited sometimes occasions an alarming degree of inflammation, and even in the most successful cases a long and irksome confinement is required. The treatment by Injection was first employed by the surgeon of a Scotch regiment, named Monro, in the early part of last century. Various trials of it were made in this and other countries, particularly by Sabatier of Paris;* but Sir J. Earle had the merit of introducing it into British practice. The object of the operation is to excite a degree of inflammation, sufficient to occasion such a change in the state of the parts concerned as may prevent the water from returning. An endless variety of fluids have been employed for this purpose, but port wine, solution of sulphate of zinc, and cold water have been chiefly used until lately, when the tincture of iodine has come to supersede all the others. It may be used either pure, by injecting a small quantity and allowing it to remain, or mixed with

* Mem. Acad. Chirurg. Tome v.

water, in the proportion of one part of the tincture to three of water. There is some difference of opinion as to the mode in which irritating fluids, injected into the *tunica vaginalis*, act in radically curing the disease. Some have alleged that the respective serous surfaces become firmly united, in consequence of an effusion of lymph from them; and others maintain that there is merely a change produced in the secreting action of the vessels, which prevents the fluid from re-accumulating, though the cavity remains as perfect as ever. It is probable that the truth lies between these two opinions, and that, though union of the adjacent surfaces is not essential to the cure, adhesions generally do take place in more or less of their extent.

The apparatus required for the operation is a small trocar, a movable stop-cock fitted to it, and a syringe or caoutchouc bag, capable of containing three or four ounces of fluid, adapted to the other extremity of the stop-cock. The trocar having been introduced as for the palliative cure, the canula should be pressed in a little further, to insure its conveying the injection freely into the cavity of the *tunica vaginalis*. The fluid is then thrown in, not in sufficient quantity to distend the sac, but merely so as to affect the whole surface, for which purpose a few ounces are always enough. It is permitted to remain from five to seven minutes, unless the patient complains much, when it may be withdrawn sooner; and, if there should be no reason for supposing that more then usual irritation is requisite, the cavity, after being evacuated, ought to be again injected. Pain stretching up along the groin, toward the loins, and occasionally slight nausea, are in general experienced during the operation. After it is concluded, the patient goes to bed, and seldom feels much inconvenience from what has been done until the following day, when the testicle swells, and more or less fluid is effused into the vaginal cavity. A slight degree of constitutional disturbance keeps pace with these local changes, and both are usually at their height on the third or fourth day. The swelling then begins to lessen, and the feverish state subsides; a discutient lotion is applied, and the patient is able in a few days to resume his ordinary occupation, though several weeks generally elapse before the swelling is completely dispersed. It is observed that the more solid the swelling consequent upon the operation is, the more speedy and complete is the cure.

Fig. 135.



The chief risk of failure in this operation is from the irritation proving insufficient, which source of disappointment may of course be easily obviated in a subsequent trial. Cases occasionally occur of an opposite kind, where, owing to an extreme irritability, intense inflammation and sloughing are induced. These effects are very distressing, and greatly prolong the cure, but they are hardly, if ever, fatal, and would in all probability attend any of the other modes of treatment even more severely. The errors to be avoided are wounding the testicle, and injecting the fluid into the cellular texture of the scrotum. The former of these has been already spoken of in regard to the palliative cure; and as to the latter, if the trocar is properly constructed with a closely fitting canula, it can never happen except through an unusual degree of carelessness. The accident is recognized by the fluid remaining, or only escaping by drops when the stop-cock is turned. If allowed to continue in the cellular substance, it gives rise to inflammation, attended with violent fever, and soon terminating in sloughing of the scrotum. The best course to follow, upon discovering that the error has been committed, is to make an incision through the punctured part, squeeze out as much as possible of the fluid, and apply warm fomentations to promote the exudation of the remainder. The hydrocele of children does not require the radical operation, as the fluid is readily absorbed under the influence of a discutient lotion, such as a solution of muriate of ammonia with spirits and vinegar, or, at all events, seldom returns if such a lotion be applied after evacuation by a trocar or lancet.

[Hydrocele, or dropsy of the testicle, is quite a common disease. There is sometimes an œdematous condition of the scrotum, with serous effusion throughout its cellular tissue, which may be mistaken for true hydrocele—as also, on a superficial examination, may schirrus or any other cause of swelling in the part.

"Hydrocele" is limited to a collection of serum in the tunica vaginalis, a serous membrane inclosing the testicle. It is but an abnormal quantity of the fluid naturally secreted to protect and allow free motion to the part affected. The immediate cause of the disease then, may be either increased secretion or diminished absorption. It may affect persons of all ages, and even exist at birth.

The swelling begins at the lower portion of the scrotum, or rather the accumulation naturally sinks and first shows itself there; gradually becoming diffused, and extending up toward the abdominal ring. The tumor is finally pyriform in shape, and elastic to the touch—or it may be described as feeling like a bladder distended with water. It gives no pain on pressure, unless the testicle itself is pressed upon. The skin of the scrotum retains its usual wrinkled state, even though the part may attain an immense magnitude, the serous bag within

sometimes containing a pint of fluid. The fluid itself is usually crystalline or colorless, occasionally yellowish.

It rarely happens that both sides of the scrotum are affected with this disease at the same time.

The diagnosis of this disease is sometimes difficult. In order to come to a satisfactory conclusion, you should examine into the history of the case. Recollect that hydrocele proper begins in the form of a tumor at the bottom of the scrotum, and gradually ascends; while anasarca of the scrotum is more diffused. Schirrus of the testicle presents a uniform enlargement, is also accompanied with pain, and quite heavy, feeling to the patient and examiner like a ball of lead. In hydrocele, moreover, when recent, before the membrane thickens, the whole mass of the tumor below the substance of the testicle is transparent or translucent—as may be ascertained by placing it, when the room is darkened, between your eye and a lighted candle. It may be distinguished from scrotal hernia, by observing that in the latter case the tumor commences above instead of below, and if the patient coughs the swelling will be enlarged, and a distinct impulse imparted to the finger pressing on it.

The cause of the effusion must be inflammation of the serous membrane itself, but that may be occasioned by disease of the testicle, by direct external influences, or by metastasis from other textures of the same order. Most generally the cause cannot be ascertained.

When there is enlargement of the testicle in connection with the serous accumulation, the case is called "hydrosarcocele."

Hydatids may occupy the tunica vaginalis, and present the appearance of hydrocele, and be mistaken for it. The two diseases not unfrequently co-exist, hydatids occupying a part of the cyst, while fluids accumulate in another part. These parasitical growths may adhere either to the serous membrane, the epididymis, or the substance of the testicle. This state of things can only be ascertained by the protruding of the cysts in question out of the wound.

Hydrocele of the spermatic cord occasionally occurs, sometimes alone, sometimes in connection with effusion in the tunica vaginalis. It occasions an oval tumor near the abdominal ring, or it may be even in the canal above the ring, having so strong a resemblance to inguinal hernia, as to be easily mistaken for it. It is, however, free from pain, and transparent, and does not go down and disappear, on placing the patient in a recumbent position, as will be the case in hernia, unless it is strangulated, when the nature of the case will be but too evident from other symptoms. Dropsy of the cord is also to be distinguished from varicocele, as will be noticed under that head.

Congenital hydrocele has some peculiarities; and cases of the same

kind, which occasionally occur in after life, are incorrectly called by the same name. The original connection between the tunica vaginalis and the peritoneum, of which it was a part, continues, and the fluids that collect in the cavity of the abdomen descend and accumulate, generally producing dropsy or "hydrocele" of the tunica vaginalis as well as of the cord. This may be distinguished from common hydrocele by placing the patient on his back and raising his hips, when the swelling will entirely recede, but instantly reappear when the erect position is assumed. The other symptoms of hydrocele, as transparency, etc., have to be also considered, as the affection may be mistaken for hernia, with which it may also co-exist (the same cause occasioning liability to both).

In recent cases, and in young persons in whom the absorbent system is active, you may sometimes succeed in effecting a cure by constitutional means—such as active hydragogue cathartics, diaphoretics and diuretics, frequently repeated for a considerable length of time. Absorption may be aided at the same time by suspending the scrotum in a bag and "T" bandage, and by stimulating applications to the surface. The solution of the muriate of ammonia and vinegar is a good lotion, keeping the parts constantly wet with it. Or the stimulating astringents may be applied, such as the compound tincture of myrrh, diluted with an equal quantity of the decoction of marsh rosemary, or of the ephiphagus virginiana. This article, if relied on, should be applied once a day, so as to produce a good deal of smarting and pain for a short time.

After having drawn off the fluid by means of your canula, inject through it brandy and water, port wine, or some other stimulus. This is to be left there until it produces considerable smarting or pain; then draw off and let the canula be removed. Take care never to take away the canula until the injection is all withdrawn, or the membranes may contract upon and retain it, producing more mischief than the natural secretion you have removed. After the removal of the fluid and canula, insert a tent (or strip of linen), far enough in to remain, and keep up the inflammation; and prevent the external orifice from closing. Remove it from day to day and apply another, until a sufficient amount of adhesion has occurred.

If too high a grade of inflammation should be excited, the tent must be laid aside, and warm fomentations, emollients, etc., resorted to. It may even be necessary to use constitutional "antiphlogistics," such as emetics and emeto-cathartics. One of the best local means in such a case is to let the patient sit over the vapor of hot herbs, after which emollient poultices can be applied until the inflammation has subsided.

This operation for hydrocele is generally effectual. In some chronic cases, however, port wine and even brandy will be insufficient; you

will have to use something stronger. I have made use of the compound tincture of capsicum and sanguinaria. In one instance, I even combined that with a pretty strong solution of the sesqui-carbonate of potash. In this case the usual operation had been repeated several times, and wine and brandy had been freely used, and even a considerable portion of the tunica vaginalis taken out, without any beneficial result. I kept the caustic solution in for several minutes before I drew it off, and the patient was in pain from it for an hour or two; and the scrotum showed signs of considerably diffused inflammation. This was of course kept under, adhesion brought about, and no future operation needed.

In all cases after having drawn off the fluid, introduce your stimulating injections; and as soon as an inflammation has subsided, apply the sal ammoniac lotion, together with some astringent, not forgetting the India rubber compress and the suspensory bandage. I have in some cases succeeded in effecting the radical cure by these applications, after simply drawing off the fluid without using any injection, and thus without the risk of undue inflammation—I might, perhaps, say, without any artificial inflammation, merely repressing that chronic effusive degree of it which already exists. I would recommend, however, in most cases where injections are not used, the insertion of a tent for a day or two. In mild cases, as I observed before, I have succeeded without even tapping. Should not this kind of surgery be much preferred, to that which at best only secures its object by bringing about an unnatural condition of the parts? The serous membranes are not so invariably doubled and provided with a lubricating secretion without some wise purpose, which must be frustrated by our obliterating the space between the folds.

The seton is highly recommended by some surgeons, and as freely condemned by others. It is applied in this manner: While the canula remains in place, insert through it a long seton needle. Pass it out through the tunica vaginalis, from two to three inches distant from the point of entrance. Tie the string or strings constituting the seton, and let it remain there from eight to ten days, observing not to remove it as you would setons in other parts. This measure is said to be very successful in the hands of some practitioners. However this may be, I regard it as quite unnecessary.

The seton may also be introduced without the canula, by pinching up a portion of the scrotum and running the needle through from side to side in such a way that the two ends will be from two to three inches apart, and the fluid will pass out gradually along the course of the seton. I certainly prefer the regular operation of tapping once for all, to this continued dribbling.

Great care is to be taken, in performing this operation, not to injure

the testicle, nor to allow the lancet or trochar to pass through the opposite fold of the tunica vaginalis, so as to make an opening into the cellular tissue on the outside, and cause a diffused inflammation there. The injected fluid should be strong enough, you must remember, to give the patient a good deal of pain immediately after its insertion, or it will do no good; and, for the same reason, you must see that it will do harm if left in too long. I have known several instances where the injected fluid was not all drawn off, thus exposing the patient to considerable danger as well as inconvenience. It is rare that the foreign fluid is absorbed.

Fluids prepared from zinc and iodine have been used instead of the old and familiar substances before mentioned, but without proof, I believe, of any special advantage.

If, after drawing off all the fluid you can, the tumor does not entirely subside, it is presumptive evidence that it is partly caused by hydatids. If the latter protrude, the nature of the case is sufficiently plain. If they do not present themselves thus spontaneously, and you have reason to suspect their existence (which cannot be known with absolute certainty beforehand), make a large opening and squeeze upon the tumors, when more or less of them will be pushed out, inclosed in their proper membranes or cysts. They may be all dissected away with the knife by laying open the scrotum sufficiently, or clipped off with scissors. This operation is very painful, but generally effectual. Clipping off a considerable portion and letting out their contents may be sufficient. The smaller ones or parts that remain will most likely be obliterated in the progress of the cure, especially if tents are used. If not, a second operation may be made, or a seton inserted so as to pass through the encysted part: this, however, is very rarely required.

For hydrocele of the spermatic cord, if external compression and stimulants, aided by constitutional means, do not succeed, I should recommend the insertion of a seton. In having recourse to this measure, however, be careful not to wound the spermatic nerve or bloodvessels, or the vas deferens. When dropsy of the cord occurs in connection with that of the tunica vaginalis, or more common form of hydrocele, the tapping of the latter relieves the cord also.

In congenital hydrocele, or other cases arising from the same cause—a continued connection between the investing membranes of the testicle and of the bowels—merely letting off the fluid, for the time, would be useless; and any attempt to excite inflammation by the usual means, would be endangering the life of the patient, as that inflammation would be very likely to extend to the abdomen.

The communication between the abdominal and scrotal cavities must first be closed. For this purpose a proper truss must be worn,

and such other means can be resorted to as I have lately shown you to be so effectual in Dr. Morrow's radical cure for hernia. The irritating plaster, however, will not be so often necessary in this case. Never attempt the ordinary treatment for independent hydrocele, until you are satisfied that all the communication with the peritoneum has been closed for a considerable time. Such attempts may succeed, but they will generally fail, often injure, and always endanger the patient.

If ascites exist in connection with hydrocele, and there is found to be a communication between the tunica vaginalis and the abdomen, the whole of the fluid may, in that case, be safely drawn off through the scrotum—that being the only point where one tapping will be sufficient. The truss and other means above recommended for closing the communication, can be resorted to when the dropsical tendency has been overcome.

If irreducible hernia exist in connection with hydrocele, no attempt should be made to cure by inflammation; but when the hernia is reducible, reduce and then proceed to cut off the communication with the abdomen by the proper treatment for the radical cure of hernia, thus preventing future hernia and one form of hydrocele by the same means.

When the testicle itself is diseased, the first attempt should be to restore that part to a healthy condition. Until that is done, all attempts at curing the hydrocele will be not only futile but mischievous.*

Professor W. Parker, of N. Y., offers the following as a good general plan, and I have found it to be worthy of attention:

A great variety of methods have been proposed to effect the radical cure of hydrocele, such as, *incision* to lay open the sac, *excision* of a portion of the sac, *caustics* externally applied, *tents* passed through the sac, *injections* of various stimulating liquids, etc. The design in the practice of each of these operations is either to excite such a degree of inflammation as shall cause adhesion of the opposed serous surfaces of the tunica vaginalis, and thus obliterate the sac, or so change the character of these surfaces as to diminish the secretion to its normal quantity.

The operation by injection of a stimulating fluid was one of the earliest proposed, and is now more generally practiced than any other, not so much for the ease with which it is performed as the certainty of its effecting a cure. For a long time wine and water composed the mixture employed, and Sir James Earle, who introduced them, stated that he scarcely ever failed in obtaining a radical cure. But this con-

* Eclectic Surgery.

fidence in injections does not accord with the experience of other surgeons, and Sir Astley Cooper, who used a solution of sulphate of zinc, remarks that it is quite contrary to his own, though he preferred it to any other method then followed. More recently, however, the tincture of iodine has come into use, and having proved more safe and efficient than the liquids previously employed, it has nearly superseded all others. In eleven hundred and forty-eight cases it is stated to have failed but three times; and in ten cases, where both wine and the sulphate of zinc had been used unsuccessfully, it failed but once. Injections, however, of all kinds require tact in their employment, and time in their preparation and administration. When unskillfully used, they are often attended with serious consequences. I have not myself been in the habit of resorting to them for the cure of hydrocele in many years, preferring the simple evacuation of the water, with scarifications of the internal surface of the sac, especially in children, or the introduction of a tent. More recently, however, I have resorted to the local application of the solid nitrate of silver to the internal surface of the tunica vaginalis in the manner described below, and have every reason to be satisfied with this method of treating hydrocele. It is at once easily and safely performed, and, as far as my experience goes, has been attended with entire success. It does not seem to induce so great a degree of inflammatory excitement as most other methods. The following may, therefore, be stated as its advantages over operations: 1. The ease and safety with which it may be performed. 2. The less liability to severe inflammations. 3. The certainty of success. The following cases illustrate the mode of operating:

Case I.—Mr. J., aged about sixty, an Irishman, waiter by occupation, unmarried, had always enjoyed good health until April last, when he discovered an enlargement of the left scrotum. It had never previously been the seat of any difficulty. The tumor increased so rapidly, that within three weeks it had become a great annoyance, and prevented him simply from its size, from continuing at his business. At this time I first saw him, and such had been the rapidity of the growth of the tumor, that it had been mistaken for hernia, and he was wearing a truss. On examination, however, its true character, that of hydrocele, was made out without difficulty; a trocar and canula were accordingly introduced, and a large quantity of water withdrawn, and the patient dismissed. In about three weeks he again applied for relief, and I proceeded to operate for his radical cure in the following manner: After drawing off the fluid contents of the tumor in the ordinary way, I introduced through the canula a common probe, the end of which was coated, for half an inch or more, with nitrate of silver. This extremity, thus charged with the caustic, was carried

lightly over the serous surface of the tunica vaginalis, in various directions and then removed. The patient complained of some pain during the operation. He was directed to keep quiet for the pain and swelling consequent on the application of the caustic, and apply cooling lotions, should the inflammation be at all severe. He returned home, but as he suffered but little pain, and the swelling was slight, and as his services could not well be spared, he continued about his business without any interruption. The pain lasted three or four days, when it ceased altogether, leaving the scrotum of its natural size. In this condition it has since remained, with no symptoms of a return of the hydrocele, the cure having been complete.

Case II.—Mr. ——, aged about fifty, a farmer from Long Island has always enjoyed good health and been able to perform the active and laborious duties of the farm. For nearly two years he has suffered from a slowly-enlarging hydrocele, the origin of which is attributed by the laborers on the farm to the water which they use; for, singularly enough, several of them began to suffer from the same disease at the same time with this patient. The water is stated, by an intelligent person acquainted with the facts, to have a strongly diuretic effect upon those who use it, but no analysis has yet been made of it, which would lead to an explanation of this peculiarity which the water seems to possess. In this case the tumor had been twice tapped during the last year, and about a pint of fluid was removed at each time. The first operation was performed about six months, and the last nearly three months, previously to the present operation. The tumor rapidly regained its former size after each operation, as no means were employed to effect a radical cure. After withdrawing the water, I proceeded to operate in a manner precisely as above described. The application of the caustic produced severe pain, much more so than in the former case. The patient was placed in bed, and an antiphlogistic regimen prescribed. The pain continued without any diminution of its severity for fourteen hours, when it began to subside. The inflammation excited by the operation was considerable, with swelling of the scrotum and some febrile excitement; he was confined to his bed three or four days, until the inflammation had subsided, when he returned to his farm. The swelling of the scrotum continued about a month, when, on the application of a spirit lotion, it returned to its natural size, and a permanent cure was effected.

Case III.—Mr. B., of Pennsylvania, aged fifty-five, of very intemperate habits and enfeebled constitution, applied for treatment of an old hydrocele. The operation was performed as in the preceding cases. Considerable pain was experienced at the time of the opera-

tion, and the subsequent inflammation and swelling were greater than in either of the former cases, doubtless owing somewhat to his unfavorable condition of system. It progressed favorably, however, and he was soon able to leave for home. I have recently learned that the operation was successful, there being no return of his difficulty.

Case IV.—Mr. J. F., bookseller, aged twenty-six, very intemperate, first noticed an enlargement of the scrotum seven months previously to the operation. The caustic was applied, as in the former cases, on the 6th of last August. The pain was considerable, and the inflammation as severe as in the last; it subsided rapidly in the course of four or five days, and he returned to his business. There has been no return of the disease.

I prefer the blending of astringent and stimulating injections, and would rely on them with more confidence. The French surgeons rely almost entirely on iodine injections. (See Nelaton's Clinic Lectures, by Atlee.) This course seems proper when it depends upon a syphilitic taint, but then we should put the patient upon a strong alterative and tonic course as soon as possible.—R. S. N.]

HÆMATOCELE.

The *tunica vaginalis* is sometimes distended with fluid, not clear and serous-looking, but of a dark-brown color, and often depositing, when allowed to remain at rest after being drawn off, a layer of florid blood; and the cavity in such cases, if laid open, is generally found to contain more or less fibrinous coagulum, partly detached, partly adherent to the sides of the sac. The disease is then named Hæmatocele. It is recognized by the characters of hydrocele, with the exception of translucency, which is altogether absent; but, as this feature may depend on unusual thickness of the sac, the only certain diagnostic is obtained by puncturing the tumor. Hæmatocele is sometimes associated with diseases of the testicle. The origin of the blood which constitutes it is involved in great obscurity; but, on the whole, seems to be ascribed with most probability to hemorrhage from the *tunica vaginalis*. The disease is almost always a hydrocele in the first instance, and the history usually given of it is, that after the ordinary serous fluid had been drawn off, the swelling returned very rapidly, and upon being tapped again, was found to be filled with the dark-colored contents above described. In cases of old standing, numerous small scales are observed floating in the fluid, and these when collected are ascertained * to consist of cholesterine.

Dr. Bostock has suggested, with apparent probability, that they are

* Dr. Christison.

not the direct result of secretion, but the product of a chemical change taking place in the effused fluid, similar to that by which adipocire is formed from flesh when subjected to long maceration in water. The same sort of scales have been found in collections of dark-colored fluid in other parts of the body, and no doubt proceeded from the same source. The *tunica vaginalis* is always very much thickened, sometimes of almost cartilaginous hardness throughout, and occasionally soft and pulpy on its inner surface. I minutely injected the vessels of an hæmatocele, which had been ascertained, by a puncture previously, to be still capable of reproducing the bloody contents, but did not find the slightest extravasation or appearance of rupture, either from disease or injury.

The treatment of hæmatocele does not afford so much room for choice as that of hydrocele, since the only method of safely and effectually relieving the patient consists in cutting away the thick and diseased *tunica vaginalis*, together with a portion of the integuments. The best way of performing the operation is to make, in the first place, a free incision into the cavity, and then, feeling the extent of the sac, cut away as much as possible of it where not adherent to the testicle. The wound should be dressed with dry lint after the vessels have been tied. Considerable constitutional disturbance may be expected; but, under proper treatment, it seldom proves excessive. Suppuration being induced, the granulating process soon brings the sides of the wound together, and completes the cure.

[The following cases from M. Nelaton's Clinic Lectures are not only very descriptive, but show the simplicity of the French plan of treatment:

Case I.—An old man entered for an affection of the scrotum, of the right side. His health had always been good, he had never had gonorrheal orchitis, and nothing could be found in his history as a cause for his present affection, which, he said, had commenced six weeks before. In the right purse was a tumor, large as the two fists, having the form of the testicle, softish in certain parts and firm in others. The integuments were normal, and the subcutaneous cellular tissue likewise; the cord was a little larger than on the other side, but that was all; its envelop only was more voluminous. The sensation of fluctuation was very marked; it was not in the slightest degree transparent. The patient had a feeling of tension in the tumor, never any pains as from cuts with a knife, but as if there was pressure on the testicle.

M. Nelaton said the tumor must be either an encephaloid tumor of the testicle, an effusion of opaque liquid, or a liquid, surrounded by opaque walls. He did not think it the first, for it had lasted but six

weeks; there was no lancinating pains, and there was nothing in the man's aspect to indicate the existence of cancerous disease. It was, therefore, a tumor constituted by an effusion of liquid, whose opacity was owing either to the nature of the liquid or that of the walls. As the affection had lasted so short a space of time, the walls would not have had sufficient time to become thick, and it was decided to be an effusion of liquid, most probably sero-sanguinolent.

Hæmatocele of the tunica vaginalis can develop itself spontaneously, and M. Nelaton said that the effusion of blood in these cases was consecutive to a serous effusion. Certain serous tissues are seen, that have an extreme tendency to let the blood ooze from them; sometimes, after the puncture of a cyst, a perfectly clear, serous liquid comes out at first, and then afterward, without any injury of the walls by the end of the canula, there is a flow of blood. This is seen, above all, in cysts of the thyroid gland. In order to arrest such an effusion, remove the canula, and it stops at once; but if you leave it, it is indefinite. A certain relation must be established between these effusions taking place when the cysts are open, and when they are not open. In this case, then, M. Nelaton thought there had been an effusion of blood into a hydrocele, forming what is called a hydro-hæmatocele. He spoke with great admiration of the Memoirs of M. Gosselin on this subject. There is sometimes a layer of false membrane deposited on the interior of the tunica vaginalis, which can have a thickness of three-fifths of an inch or more. In the present instance, there was an effusion of bloody serum, and a layer of false membrane of a certain thickness.

Hæmatoceles do not have that tendency to remain tranquil that hydroceles have; they tend to open outward by means of an inflammatory process.

Injections of iodine, according to the experience of M. Velpeau, succeed best in the serous sacs, after them in the synovial; and thirdly, in cases of hæmatocele, and the success in these is according to the proportionate quantity of blood in the contained liquid being less as it is greater; when the color is chocolate, as it was believed to be in this case, they generally fail. The simple incision into a hæmatocele is a grave operation, because it is often followed by putrid infection. It was decided to puncture by a trocar and inject the iodine, as in ordinary cases of hydrocele. It is difficult to make sure of avoiding the testicle; in fact, there are no certain means of doing it. It may be said that its situation can be determined by its peculiar sensibility; but that this cannot always be relied upon was made very evident by a case a few days before, in the wards, where the testicle was perfectly well seen, for the liquid was transparent, and yet when it was pressed the patient did not feel it.

M. Nelaton thinks that castration is less dangerous than the resection of a portion of the tunica vaginalis; the thickened walls become the seat of an inflammation of a bad character; there is decomposition of the discharge, and putrid infection results.

A puncture was made, a dark fluid came out, and the injection of iodine was thrown in. Things passed just as in the case of simple hydrocele; the skin became red and tense, and the subcutaneous cellular tissue congested. There is a strong temptation to make a second puncture, in order to let out this secondary effusion, and obtain a more speedy cure, but it should never be done. M. Nelaton related some cases in which most troublesome consequences followed, and even death. At the end of ten days, a small abscess formed, and was opened, where the puncture had been made; in the tunica vaginalis all was doing perfectly well.

After remaining three months in the hospital, the old man went out. The purse was still quite voluminous, but it was gradually diminishing. After the injection, it had swollen so as to be thirty-two centimeters, or thirteen inches, in circumference, and at the time he left it was twenty-five. M. Nelaton expected a perfect cure to result.

Case II.—A man entered the wards on account of an injury he had received about the scrotum. While mounting from the street upon the pavement, one foot already upon the latter, so that his legs were separated, he received a kick from behind from a foot that passed between his legs and struck the lower part of the scrotum. He fell senseless, and at the end of twenty minutes was told what had happened. There was, soon after, a change of color in the skin of the scrotum, and the next day its contents were augmented in volume. He remained in bed two days, and then came into the hospital. There was ecchymosis extending forward to near the corona of the glans, on the inferior part of the penis, and backward along the perineum to near the anus.

The scrotum was increased in size, and chiefly on the right side. The cause of this increase might be: 1. An effusion of blood in the subcutaneous cellular tissue; 2. Œdematous infiltration; 3. Effusion in the tunica vaginalis; 4. Effusion in the testicle itself. There was nothing like the second, like œdematous infiltration, for the integuments were wrinkled, and pressure did not diminish the volume. It was very easy to see that there was blood in the cellular tissue under the skin, forming what is called parietal hæmatocele. Sometimes this blood is coagulated, and you feel a hard tumor; not so hard, however, that it cannot be crushed under the fingers, giving rise to a peculiar sensation. In this case there was not effusion of blood, it was an infiltration. There was, then, a *parietal hæmatocele by infiltration.*

There was no effusion in the tunica vaginalis, for there was no deep fluctuation. At the same time, with the other, there was a *testicular hæmatocele*, an effusion of blood under the tunica albuginea; a traumatic orchitis existed; there was excessive pain in the testicle.

This blood under the tunica albuginea can be absorbed, but in some cases it has been necessary to make punctures into the body of the testicle, and the seminiferous ducts are lost. The excessive pain in the testicle made M. Nelaton very reserved in his prognosis.

The man was confined to bed, quite abundantly bled, and leeches were applied to the inguinal region and to the perineum. Everything went on very well, and the man recovered.

Case III.—A young man came into the hospital on account of a tumor of the scrotum. He said that he used to have a hernia on the left side, for which he wore a bandage when but three years old; but it was evident, from the answers he gave to some questions put to him, that he had worn it without paying attention as to whether the hernia was out or not.

When he entered, there was no trace of a hernia, but on the left side there was a tumor, as large as a hen's egg, placed in the upper part of the purse; instead of going to the bottom of the purse, it tended to go backward toward the perineum. Just in front of it, at the upper half, was the lower portion of the spermatic cord, and at the lower, the testicle. This tumor was liquid, the walls were soft, and fluctuation was perfect; and yet, though the greatest possible care was taken to distend the walls, and to place the light favorably, it was impossible to produce indubitable transparency. M. Nelaton did not think this opacity to be owing to the nature of the liquid, for spontaneous hæmatocele is too rare, and yet the thickness of the walls, as appreciated by pinching up the coverings of the liquid, did not seem sufficient to account for it. He, however, considered the walls, rather than the nature of the contents, as its cause. He said it might be a hydatid, as he had once met with a similar case, which proved to be one.

This tumor did not present the ordinary symptoms of encysted hydrocele of the cord. The manner in which the testicle descends, and an inflammatory process obliterates the peritoneal sac, are well known. Sometimes, however, this process is imperfect, and serous sacs are left, in which effusions can take place. Tumors formed in this way, however, vary very little in their relations with other parts; experience has shown that when they have acquired a large volume, they descend into the cul-de-sac, between the globus major of the epididymis and the cord, and there they remain.

When the epididymis has changed its position, as it sometimes does,

being anterior in place of being posterior to the body of the testicle, the tumor of a collection of water in the tunica vaginalis will appear to be behind, but in such cases the position of the cord in front of it will clear up the diagnosis.

Whatever the case might be, the puncture of the tumor and the injection of iodine were what was to be done in its treatment. In regard to acephalocyst tumors, it is not, as yet, well know how they behave under the iodine injections; but, in some few cases, M. Nelaton has found that things went on just as when they were made into a serous cavity.

The introduction of the trocar proved this to be a case of spontaneous hæmatocele, and not an encysted hydrocele of the cord. M. Nelaton said he had neglected to consider the duration of the disease; it had lasted but eight months, and in that time the walls could not possibly have acquired such a thickness as not to be transparent. Moreover, for a hydatid to acquire the size of the tumor, two years would have been required. This shows how important it is, in every case, not to omit any consideration.

Like hydrocele, hæmatocele may depend upon syphilitic disease, and of course, all such complications will embarrass the treatment.—R. S. N.]

CIRSOCELE.

The veins of the testicle, which enter into the formation of the spermatic cord, are subject to varicose enlargement, particularly on the left side. The vessels become greatly dilated, thickened in their coats, and extremely tortuous. There is thus caused a swelling, which alarms the patient, occasions a dragging uneasy feeling in the groin and back, aggravated by standing or walking, and is itself also sometimes the seat of disagreeable sensations. When the dilatation occurs high in the cord, near the external ring, it sometimes bears a great resemblance to inguinal hernia. In order to distinguish between the two diseases, the patient is generally laid in the horizontal posture, when the swelling disappears, whether of the one kind or the other. Pressure is then made at the ring, and the patient rises, when the swelling will reappear if depending upon vascular enlargement, as the blood cannot thus be prevented from finding its way through the arteries, but the tumor will not return if of a hernial nature. This test, though often decisive, is frequently ambiguous; and it seems a more certain means of ascertaining the truth, to compress the neck of the swelling, while the patient stands erect, when, if composed of dilated veins, *it will become more tense*. Cirsocele is met with chiefly in young men between twenty and thirty, but frequently occurs soon after puberty, and also sometimes before it, when the diagnosis from inguinal hernia is apt to be extremely difficult. It exists in very various degrees of size,

and occasions more or less inconvenience accordingly. It does not seem to interfere with the functions of the testicle. The distended veins are liable to inflammation, which, extending to the cellular substance in the neighborhood, occasionally leads to the formation of abscesses that leave very troublesome sinuses.

The circumstances, which determine the commencement of the disease, have not been ascertained. It is certainly more common in persons who have indulged in venereal excesses, but often exists quite unconnected with any such habits. It tends to increase to a certain extent, and then either remains stationary, or diminishes. The patient is generally rendered very anxious by the complaint; but the small inconvenience which attends it, does not warrant any very severe measures for his relief. Washing with cold water, completely removes the swelling for a time, by corrugating the scrotum, and bracing up the testicle to the pubis. A suspensory bandage effects this more permanently, though not so efficiently; and an open state of the bowels, with rest in the horizontal posture, contributes to keep the disease within bounds. The means of radical cure consist in extirpation of the testicle, which can hardly, if ever, be warrantable; ligature or transfixion of the veins, which is dangerous and very uncertain; and excision of the scrotum, except a portion of it sufficient to cover the testicles, but not to let them be pendulous. When the veins suffer from inflammation, a lotion of acetate of lead with opium, and uninterrupted rest in the horizontal posture, ought to be prescribed; and, if abscesses or sinuses should result, they must be treated on the general principles that have been explained.

CHRONIC ENLARGEMENT OF THE TESTICLE.

The testicle is very liable to simple enlargement, with hardening, which produces uneasiness from the bulk and weight attending it, and no doubt impairs the action of the gland; but is seldom painful, or very sensible of external impressions. It is generally irregular on the surface, and dense in its structure. The circumstances which most frequently give rise to this condition, are attacks of inflammation, especially when repeated, or badly treated, and chronic irritation of the urethra, or other causes.

In commencing the treatment, the first step should always be to examine the state of the urethra by passing a moderate sized bougie, and if it either meets with obstruction or causes more than usual pain, thus indicating a morbid sensibility of the lining membrane, the operation must be repeated with instruments varied according to the nature and peculiarities of the case, until there is no longer any trace of disease. Even when the urethra seems to be sound, advantage is occasionally derived from the use of bougies, and in a week or two, or

sometimes in a few days, very formidable-looking tumors are thus discussed. Should the swelling exist along with a sound state of the urethra, or resist this treatment, means of promoting absorption must be employed. With this view the patient should maintain the horizontal posture, use a very spare diet, and be subjected to a gentle course of mercury; at the same time having the absorbent actions of the part excited by leeching, and discutient lotions, which answer better than blisters or ointments. If there is water in the *tunica vaginalis*, a complication named Hydro-Sarcocele, the fluid ought to be evacuated by puncture before these local measures are instituted. When the swelling attains a large size, and resists a patient trial of the means that have been mentioned, it may be removed by the knife as a last resource, and of course with a favorable prognosis in regard to the prospect of permanent recovery. A section of the tumor removed in such cases generally exhibits a compact fibrous structure, which is usually of a yellow or yellowish-gray color, and contains irregularly-sized cells interspersed through its substance.

[The object entertained by Mr. Syme in recommending mercury for this state or disease, is to excite absorption, which to all intents and purposes can be much more easily accomplished by other agents, *e. g.*, iodine injections and poultices; iodine, cerates and lotions, and the free administration of iodide of iron internally, or what is still better, compound syrup of stillingia sylvatica, or a combination of stillingia, phytolacin and rhusin. This habit of physicians of laying so much stress on calomel and other preparations of mercury, shows that they have paid too little attention to the real therapeutic value of other agents.—R. S. N.]

CYSTIC SARCOMA OF THE TESTICLE.

The testicle is liable to the formation of cysts in its texture, and these sometimes occupy so much of it, as to constitute a mass in which the cystic character predominates. When this disease is associated with hydrocele or hæmatocele, its diagnosis cannot be made out with accuracy, until the fluid in the *tunica vaginalis* has been drawn off. The only remedy for this affection is removal, and the operation may be performed with less regret, as the glandular structure of the testicle always suffers such atrophy, or changes of texture, that it cannot be expected to perform its function.

MEDULLARY SARCOMA OF THE TESTICLE.

Excepting the bones and the mamma, the testicle is perhaps more subject to the derangement of nutrition, which leads to this morbid growth, than any structure in the body. It is generally met with at and before the middle period of life; sometimes commencing without any

assignable cause, but not unfrequently being referred to blows, or bruises, or to inflammation excited by other means. The patient's appearance is generally healthy, and the diseased action shows less tendency to spread than when it occurs in other parts. The tumor merely enlarges, becoming very irregular and tuberous on the surface, and exhausts the patient by the irritation which the pain attending it occasions; but the integuments and glands are extremely slow in acquiring the morbid disposition, so that the operation of removal, which of course, affords the only means of relief, is performed even in very advanced cases with a favorable prognosis. In the earlier stage of the growth, it is often found very difficult to determine positively, by external examination, whether the swelling is solid, or depends on the presence of fluid. The globular shape, tendency to tuberous projections of the surface, pain, and equality of consistence at all parts of the tumor, observed when it is solid, may generally render the discrimination precise; but in cases of doubt, the truth can readily be discovered by making a puncture, which can do no harm, if the patient is prepared to submit to extirpation of the testicle in the event of its proving necessary. The tumor, when divided, displays the characters peculiar to such degenerations, namely, a soft brain-like pulpy substance, irregularly partitioned by thin septa of cellular texture, and varying in color from white to dark-red according to the proportion of blood which enters into the composition of the mass.

SUPPURATION AND FUNGUS OF THE TESTICLE.

Young men of scrofulous constitutions are liable to abscesses and sinuses of the testicle, which prove very obstinate unless they are freely dilated by incision. It might seem in such cases that extirpation would be a simpler, much speedier, and hardly more injurious mode of relief, than thus laying open the structure of the gland, by dividing it in various directions; but after the cure is completed, very little trace of these incisions remains, and the organ seems still capable of performing its office. It occasionally happens after suppuration has taken place in the testicle, particularly when induced by the cachectic state caused by mercury and preceded by hardness, and the resulting matter has been discharged, that a fungous excrescence protrudes from the opening, presenting a very formidable appearance, which formerly led to removal of the organ as affected with malignant disease. Mr. Lawrence* pointed out the true nature of these productions, and explained, that they depended not upon the peculiarity of action, but the peculiarity of structure, which, being soft and inclosed in a firm capsule, tended to expand, when the coverings were

* Ed. Med. and Surg. Journal.

perforated so as to permit its doing so. He ascertained that, if the excrescence were cut off or destroyed by caustic, the remaining surface granulated; and, though it might repeatedly protrude again to a smaller extent, that ultimately, through a repetition of the same means, followed by pressure, it became completely cicatrized. As the hemorrhage, from cutting off the fungus, is very inconsiderable, this method ought to be preferred on account of its quickness, and the comparatively small pain attending it.

EXTIRPATION OF THE TESTICLE.

The mode of removing the testicle, whatever be the circumstances requiring the operation, is to be conducted on the same principles, which may now be explained. The points of most importance in determining these, are: 1. The quantity of integument to be left; 2. The suppression of the bleeding; and 3. The dressing of the wound.

When the tumor is large and of rapid growth, the skin covering it is not only put very much upon the stretch, but also borrowed from that of the penis and the other testicle; consequently, if the whole of it were taken away, a very large exposed surface would remain. If, on the other hand, none of the integuments, or only a small portion of them, were removed, more especially in a case of slow and long-continued swelling, though the corrugating effects of the contractility of the scrotum, excited by the irritation of the operation, might, in the first instance, make it appear that no inconvenience was likely to result, the redundant integument would certainly, so soon as it became relaxed, afford an ample receptacle for the accumulation of blood or pus, and present a very extensive granulating surface, that must greatly prolong the cure. Keeping these different considerations in view, the surgeon should endeavor to preserve merely enough of the integuments to allow the edges of the wound to be brought together, without either straining or laxity. In regard to the hemorrhage, great apprehension has been entertained lest the cord should be retracted by the cremaster muscle, and the artery withdrawn beyond reach of the ligature. This has led to many coarse and dangerous expedients, such as tying the whole cord previous to its division, or including all its vessels together except the *vas deferens*. Violent pain, fever, inflammation, convulsions, and even death, were the consequences of this practice, which is now abandoned, the artery being tied alone; but the fear of retraction still excites uneasiness during the operation. It, therefore seems necessary to remark, that, as the cremaster muscle is attached very near the external ring, it cannot withdraw the cord except to a very small extent, and that, if the artery retires at all, it must do so in consequence of its own elasticity.

Retraction on this account may be expected in proportion to the size of the tumor, the rapidity of its growth, and the nearness to the external ring, of the point at which the cord is divided. In no case, however, will it be necessary to use any force in retaining the vessel, and the assistant may readily secure it either between the nails of his thumb and fore-finger, or with forceps. Beside the spermatic artery, there are always several, and sometimes so many as seven or eight vessels coming from the groin and perineum, that require to be tied.

Such being the principles to be followed in performing the operation, it may now be right to explain succinctly the mode of proceeding. The patient should be laid reclining on a table or bed, with the thighs widely separated, and the hair of the pubis shaved off. The surgeon then grasping the testicle in his left hand, makes with a scalpel two incisions, commencing at the external ring, and uniting at the bottom of the tumor. He next cuts down to the cord, where these incisions meet above, passes his finger under the vessels, and then desires the assistant to lay hold of them. He now divides the cord as low as is consistent with entire removal of the disease, and pulling the lower end of it toward him, turns out the testicle, which may be detached very rapidly with a few strokes of the knife, while the penis and sound testicle are drawn aside. The spermatic artery, and any branches of the perineal or inguinal vessels that threaten to bleed are then tied, the cavity is filled, but not stuffed, with lint, and a T bandage is lastly applied, to afford the requisite support.

SARCOMATOUS ENLARGEMENT OF THE SCROTUM.

The scrotum is liable to an enlargement, which seems to consist merely in a morbid growth of the cellular substance, with interstitial deposition of albuminous matter, so as to give it a very firm consistence. When exposed by a section, the structure appears white, compact, and homogeneous, except where small cells containing glairy fluid are interspersed through it. The growth begins in the lower part of the scrotum, but, as it proceeds, engages the whole of it, together with the skin of the penis, which becomes completely concealed from view. The prepuce is greatly elongated, and presents at its orifice a tuberculated cauliflower-looking excrescence, that does not bear the slightest resemblance to the part in its natural state. There are no limits to the size which such tumors may attain. Twenty, forty, or even sixty pounds weight is by no means uncommon; and there is one case on record in which the mass when removed weighed one hundred and seventy pounds.* The disease generally commences in adults, and increases slowly during the remainder of life. It is com-

* Titley on the Diseases of the Genito-Urinary Organs, 1831.

mon, in tropical countries, particularly the West Indies, but occurs comparatively seldom in the temperate climates of Europe.

The only remedy for this oppressive growth, which impedes progressive motion, and occasions other serious inconveniences, consists in its removal. This object has sometimes been attained without taking away the penis and testicles; but the former of these organs is so deeply imbedded in the substance of the tumor, and its texture is usually so vascular, that such a procedure can seldom be practicable. If an attempt is made to preserve the sexual parts, flaps of the integuments must be preserved of sufficient size to cover them. Should, on the contrary, the removal of the entire tumor be determined on, the incisions may be executed with great rapidity, which mode of conducting the operation is much safer than cutting slowly, with the view of securing the arteries as they are divided: for both the pain and hemorrhage are thus greatly increased, and the patient, instead of being relieved from his load in a few seconds, may be detained under the knife for hours.

The labium of the female is occasionally the seat of a similar growth. It possesses the same structure, gives rise to similar inconvenience, and admits of no other remedy.

CANCER OF THE SCROTUM.

Mr. Pott (1775) described a cancerous ulceration of the scrotum, which he had frequently remarked in adult chimney-sweepers. Succeeding surgeons have confirmed the accuracy of his observations, so far as London is concerned; but in Edinburgh and other parts of Scotland, this chimney-sweepers' cancer is never met with, except in persons who have begun to suffer from it elsewhere. The following is the description of Mr. Pott: "It is a disease which always makes its first attack on, and its first appearance in, the inferior part of the scrotum, where it produces a superficial, painful, ragged, ill-looking sore, with hard and rising edges. The trade call it the soot wart. In no great length of time it pervades the skin, dartos, and membranes of the scrotum, and seizes the testicle, which it enlarges, hardens, and renders truly and thoroughly distempered, from whence it makes its way up the spermatic process into the abdomen; most frequently indurating and spoiling the inguinal glands. When arrived within the abdomen, it affects some of the viscera, and then very soon becomes painfully destructive."*

The only remedy for this disease is removal of the cancerous part; and unless the operation be performed before the morbid process has advanced far, it does not afford any chance of a permanent cure.

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* Pott's Surgical Works, Vol. iii., p. 177.

DISEASES OF THE FEMALE ORGANS OF GENERATION.

The vagina is sometimes more or less completely obstructed by a membrane at its orifice, which opposes the exit of the menstrual discharge. The non-appearance of the menses at the usual period of life, or the symptoms connected with their retention, should always lead to an inquiry respecting the conformation of the parts, and if such a congenital imperfection as the one just mentioned is discovered, the patient may be completely relieved by a very simple operation; all that is necessary being to divide the membrane with a knife or scissors, and interpose a piece of lint between its cut edges. The vagina, in some rare cases, has been found altogether wanting for part of its extent, in which cases, of course, nothing can be done in the way of remedy.

The Uterus is subject to the development in its substance of simple sarcomatous tumors of a very firm fibrous structure, which often grow from different parts of the organ at the same time, and, though generally not exceeding the size of an egg, are sometimes so large as to distend the abdomen far beyond the limits of an ordinary pregnancy. Iodine and other medicines are prescribed, both locally an internally, with the view of promoting the discussion of such growths; but it is probable that nothing can have any beneficial effect upon their progress except attention to the mode of life, which should be of a kind calculated to excite as little as possible the system in general, and the uterus in particular. Any operation is quite out of the question.

Cancer of the uterus occurs occasionally, but is fortunately not frequent, since the situation and connections of the parts affected prevent the only effectual remedy for carcinomatous disease from being put in practice, without inflicting a mortal injury. A few cases are recorded in which the uterus is said to have been extirpated when previously prolapsed beyond the orifice of the vagina, and permanently retained in this situation by the adhesions resulting from inflammation. It is only in such circumstances that the operation ought ever to be contemplated, and even here it must be regarded as affording a very small chance of success, so that, unless the patient's sufferings are very great, and threaten to terminate fatally soon, it could hardly be recommended with propriety. Langenbeck* supposed that he succeeded, on one occasion, in dissecting out the uterus without injury to the peritoneum, which remained in the form of a bag, and the patient did well. It is difficult to conceive how such a dissection could be successfully executed; and it would be wrong to undertake the operation with almost any expectation of doing so. If removal is attempted in the

* Neue Bibliothek fur die Chirurg. Bd. i.

case of prolapsus, an incision should be made on each side so as to embrace the neck of the uterus, and while the diseased mass is pulled strongly outward, its detachment is completed by carrying on the dissection inward, the vessels being tied as they are divided. Perfect rest, the strictest antiphlogistic regimen, and cold applications to the external parts, must be enjoined after the patient is put to bed, together with depletion, opiates, or other means that may be suggested by the circumstances of the case.

[Depletion will be effected by the vapor-bath quite as easily and with much better results. Let the surgeon remember that he can push it to any desired extent.—R. S. N.]

The uterus may be extirpated more easily and safely, when it is in the state named Inversion by accoucheurs. It is in this case turned inside out, so as to form a round or pyriform tumor, either confined to the vagina, or protruded beyond the vulva. When this eversion, which generally takes place at the time of delivery, is not immediately remedied, it is apt to become irreducible; and the patient suffers many disagreeable symptoms from the unnatural condition of the organ, especially frequent hemorrhage, downbearing pains, and general weakness. In cases that resist more gentle means, the tumor may be removed by ligature, which should be of strong twine or silk; and either applied simply round its neck, or carried through the middle of it double by means of a needle, one of the threads being then tied on each side. If disagreeable effects ensue, opiate injections into the rectum, and the hip-bath, will be the most efficient measures for affording relief.

Polypous excrescences frequently grow from the inner surface of the uterus, and either remain confined to its cavity, or descend into the vagina, sometimes even protruding externally. These tumors have a pyriform shape, and a firm consistence. They possess little sensibility, but much vascularity, and occasion many unpleasant symptoms, such as bloody and mucous discharges, pain in the back, weakness, emaciation, and general bad health. They cannot be either positively recognized or removed, unless when they extend below the *os uteri*. If they cannot be brought into view, the best mode of removing them is to tie a strong ligature as closely as possible to their root. This is executed much more easily by means of the fingers, than any of the apparatus contrived for the purpose. When the neck of the excrescence can be pulled beyond the orifice of the vagina, the simplest and speediest mode of proceeding is to transfix it with a needle, and carry through two threads, which are then tightly tied, one on each side, after which the tumor may be removed by the knife. There is often considerable difficulty in distinguishing growths of this kind from eversion of the uterus. Their history, deficient sensibility, and their having

round their root a ring formed by the *os uteri*, in general afford sufficient diagnostics on a careful examination. It may happen that the polypus, being very large, causes eversion of the uterus, which will thus seem to constitute a neck to it. In these circumstances, the discrimination will be hardly practicable, but removal must be performed in either case, and in the same way; so that the decision of the question is of little consequence.

Excrescences frequently grow from one or both lips of the *os uteri;* and by bleeding, or exciting the usual symptoms of uterine irritation, occasion great distress. It has been found by Lisfranc, and other French surgeons,* that their excision may be performed without any bad consequences, and with the best effects, even when they have attained a very large size. The instruments employed for the purpose consist of hooked forceps to draw the morbid growth into view, and curved scissors or a bistoury to cut it away. The hemorrhage may generally be restrained by cold applications and plugging the vagina with lint or sponge; but if it should prove excessive, the cut surface must be again drawn out and compressed, by transfixing it with a couple of threads, and tying one on each side.

The Ovaries are liable to various morbid conditions, but particularly two, which often become the subject of surgical consideration. Of these, the first that may be mentioned consists in the development of cysts in their substance, which is thus converted into a cystic tumor. The swelling is at first felt round, firm, and movable in the inguinal region. It gradually increases, not owing to an equal enlargement of all the cysts, but an extension of one or more of them. The cavity of the abdomen is distended, and at length appears as if the peritoneum were the seat of dropsical effusion. The progress of the disease is very variable; sometimes proceeding rapidly to the extinction of life, by pressing to a fatal degree on the vital organs of the abdomen or chest, but more frequently allowing years to elapse before coming to this termination. The disease commences most frequently in young females, but is met with at all periods of life. It is distinguished in its advanced stage from ascites, chiefly by the history of the case.

The treatment of Ovarian Dropsy, as this affection is called, proves still less satisfactory than that of dropsy of the peritoneum, which will not excite surprise, when it is recollected, that the diseased action in the latter case is simply an increased secretion, while in the former, it is a new and peculiar formation. Purgatives, diuretics, and all other means employed to promote absorption of the accumulated fluid, almost invariably prove quite unavailing; and paracente-

* Archives Generales de Medecine—*passim.*

sis, though it affords some temporary relief, seems in general to hasten the progress of the disease. The operation, therefore, ought not to be performed, except when the patient is suffering extreme distress, and threatened with speedy dissolution. Various methods of effecting a radical cure have been proposed, and in a few cases subjected to trial. Of these, the chief are, throwing injections into the sac, introducing a seton through it, and drawing it out of the abdomen by a small aperture in the parietes. The extent, situation, and connection of the cysts, must render such proceedings dangerous and uncertain; and, even if, by some rare chance, any of them should prove successful in removing or obliterating the sac, the disease, though retarded for a time, would, in all probability, soon recur—for the sac does not exist alone, but in association with many others of a smaller size, which possess the same nature, and may consequently serve as the germ of a future swelling. If the method of extraction should ever be attempted, it must be confined to those in which the tumor has not attained a very large size, and is still not adherent to the peritoneum. Injections and setons, again, are applicable only where the sac has adhered to the parietes of the abdomen, so as to prevent effusion on the surface of the peritoneum, and diminish the risk of inflammation.

The ovaries are subject to enlargements of a solid kind, which not only occasion inconvenience by their size and weight, but are generally the seat of painful sensations. The structure of these tumors is generally of a complicated kind, displaying, when exposed by a section, the characters of vascular, fibrous, cystic, and medullary sarcoma, in variable proportion and distinctness. The disease is sometimes rapid in its progress, but usually slow, and often exists for years before giving much trouble. After attaining a certain extent, it sometimes remains stationary, and the patient becoming habituated to its presence, suffers comparatively little inconvenience. Iodine, leeches, and other means calculated to promote absorption or allay irritation, are employed in such cases, but with hardly any perceptible advantage; and all that can be done by external measures, whether local or general, seems to be to retard the morbid process through the effect of diet and regimen. Excitement of every kind ought to be avoided—the secretions ought to be carefully maintained, and if any local means are used, they ought to be of a soothing kind, such as warm fomentations.

The inefficacy of medicine, in remedying tumors of the ovaries, has led to the trial of surgical operations for their removal. The obvious objections to such a proposal are: 1. The uncertainty that must always attend the diagnosis of the disease, which is often very closely simulated by distension of the bowels, thickening of the omentum,

enlargement of the liver, and growths from the uterus; 2. The impossibility of ascertaining before the abdomen is laid open, whether or not the connections of the tumor allow of its removal without the infliction of a mortal wound; 3. The danger of the operation even in the most favorable circumstances; and, 4. The difficulty of knowing how long the patient may live if the disease is not interfered with. These theoretical objections have been amply confirmed by experience; and though one or two fortunate patients may have escaped after being freed from part or even the whole of the disease, it would be very unjustifiable to repeat such hazardous experiments, since it is evident that for every life prolonged by them many must be sacrificed.

[The American surgeon will be greatly surprised to hear so good a surgeon as Mr. Syme urging objections to operations for ovarian tumor. But it is only another evidence that what would be considered an impossible feat for almost any surgeon in Europe, is a matter of easy and successful accomplishment in the United States.

For further remarks upon this subject, the reader is referred to the article upon Ovarian Statistics.—R. S. N.]

CHAPTER XXII.

BRAIN, SPINAL MARROW, AND NERVES.

INJURIES OF THE BRAIN AND ITS COVERINGS.

Concussion, or a violent shock, may act injuriously both on the brain and the parts which inclose it, either separately or together. It occasions at one time rupture or laceration, and at another merely disturbance in the vital action. In both cases it is apt to excite inflammation, and then, beside its primary effects, produces very important secondary ones.

Concussion of the brain is caused by blows on the head, or by falling in such a position, as prevents the force of the shock from being diffused over a number of intermediate articulations, before reaching the head. The effect of blows on the head in producing concussion is proportioned to their force, the flatness of the surface applied to the skull, and the resistance it makes. The symptoms of the injury vary with the degree of it. If there is no laceration of the cerebral substance or membranes, the patient merely suffers a temporary diminu-

tion or suspension of the functions of the organ. In very slight cases, there is confusion of ideas, and weakness of the voluntary muscles, which last only a few minutes. When the shock has been more severe, the patient is quite insensible; his pulse is small and irregular; his breathing is slow and feeble; his pupils are fixed, generally in a contracted, but sometimes in a dilated state, and there is occasional vomiting. This condition seldom lasts beyond ten, or at the most, twenty minutes, and is succeeded by a return to health, which either continues or terminates in inflammation. When the concussion has caused laceration of the cerebral substance, the insensibility is of longer duration; and when at the end of some hours, or it may be a day or more, the patient begins to give signs of returning consciousness, he recovers very imperfectly, and only for a short interval before inflammation commences. In such cases, death often occurs within a few hours, or even a shorter period after the accident, and before any signs of recovery from the insensible state can be perceived.

The treatment of concussion may be conveniently considered, in reference to the three stages of the consequences of the injury which have been mentioned, namely: that of the concussion properly—that of recovery—and that of inflammation. During the first of these, little or nothing ought to be done, except putting the patient to bed, and applying some source of artificial heat to his feet if necessary. Bleeding would be decidedly improper; and the exhibition of internal stimulants, though it might hasten the recovery of sensibility, might also increase the violence of subsequent reaction. Unless, therefore, the signs of debility in the vital actions should be alarming, the patient may be trusted entirely to the powers of his constitution.

The second stage, or return of sensibility, requires more attention, since the treatment during this stage greatly influences the succeeding one. The patient is apt to suppose himself quite well, and to have fortunately made a very easy escape from the effects of his accident; but were he, in accordance with this belief, to expose himself to cold, or subject himself to the excitement of exercise or stimulating food and drink, he would render inflammation almost certain, and aggravate its intensity beyond that which would otherwise have resulted from the injury. He ought, therefore, to be confined to the house, or to bed if the case is severe, and restricted to the most scrupulous antiphlogistic regimen for a few days. So far as the brain is directly concerned, he might safely resume his usual habits after this period of probation, but its coverings being apt to suffer, or perhaps, more correctly, to show signs of the suffering at a more distant date, in consequence of the injury they have suffered, as will be explained hereafter, he should for several weeks at least be very abstinent, if the blow has been at all severe. The restoration of the sensorial faculties is some-

times only partial, and the patient then remains permanently defective in respect to some of them, particularly memory. Sometimes also the character or disposition of the individual is observed to be changed.

The symptoms of inflammation of the brain generally appear within from twelve to twenty-four hours after the injury has been sustained. The pulse becomes quickened and sharp in its stroke; the skin feels hot and dry; the patient is restless, complains of headache, and is unusually sensible to light and noise. If the disease proceeds, the indications of it just mentioned become more strongly marked. Delirium and spasmodic contractions of the muscles come on, and are soon succeeded by insensibility and palsy of the limbs, and death closes the scene in the course of a few days at farthest. On dissection, the brain or membranes are found very vascular, with purulent effusion on the surface of the latter, and softening of the substance of the former. In cases where the texture of the brain has been lacerated in the first instance, the state of insensibility and collapse which immediately follows the accident, after a period of variable length, from a few hours to twenty-four, gradually passes into that of inflammation, generally with the intervention of an imperfect return of sense and voluntary motion, which is apt to suggest delusive hopes of improvement. The patient expresses pain by restlessness and moaning — his imperfect ideas are strangely associated—his limbs are rigid or convulsed—and in a short time he passes into the same condition as if the inflammation had originated from mere derangement of action, and not alteration of structure. On dissection, the cerebral substance at the injured part is found softened, and seeming as if mixed with blood and pus.

In treating all inflammatory attacks it is of the utmost consequence to employ the remedial measures as early as possible, and in none is it more necessary to do so than in this. Free general depletion, followed by cupping on the neck, powerful cathartics and injections, shaving the head, and applying cold to it, with the liberal administration of tartrate of antimony, are the means to be chiefly trusted for breaking the strength of the disorder. By leeching the temples, and keeping up a copious secreting action of the bowels, the remaining symptoms are in general removed, if the other more efficient measures prove successful in subduing the force of the disease. Sometimes the inflammation assumes a chronic form, which, though not attended with much immediate danger, is very distressing, and may lead to permanent affections of a very unpleasant kind. In this case the patient's pulse does not descend to the natural standard, but continues small and frequent; his tongue displays a yellowish-white fur, his skin is hot and dry, he has no appetite, his sleep is disturbed, he complains of headache, his complexion is sallow, and the expression of his countenance indicative of anxiety. Free purgation and blistering of the head are

the best means of counteracting the morbid condition which gives rise to these symptoms, and which, if permitted to go on, may occasion thickening of the membranes, or disorganization of the brain, attended with epilepsy, fatuity, and ultimately with death.

It appears that the *dura* and *pia mater* may also suffer from concussion, since they sometimes inflame, and produce peculiar symptoms in cases where the head has been subjected to violence, that can act only in this way. Blows which expose the bone are the most common sources of such effects, and frequently give rise to them, though of inconsiderable violence. The patient after a little confusion or stupor, may feel quite well, and follow his ordinary pursuits for several days, at the end of which, generally from the seventh to the eleventh, he begins to feel some indication of the disease that is going on within his head. The pulse becomes frequent and wiry; his tongue is furred; his countenance anxious; his sleep broken; and he feels a general uneasiness, with indisposition for all active exertion whether of body or mind. Headache, with intolerance of light and noise, then succeeds, with occasional rigors; but delirium and convulsions are more slow of appearing, than when the cerebral substance is the seat of inflammation. At length these symptoms present themselves, and are speedily followed by insensibility, involuntary discharges from the bowels, and death. On dissection, an effusion of pus is generally found occupying a more or less extensive portion of the surface of the *dura mater*, which is separated from the bone and altered both in color and consistence, or of the subjacent *pia mater* and substance of the brain. As the approach of this disorder is slow and insidious, while the means of checking it can be used with effect only in the commencement of its progress, all injuries of the head that can possibly give rise to it ought to be treated with care.

The patient should for weeks abstain from every kind of excitement, and endeavor to preserve his secretions in the most healthy state. Quickness of the pulse, and headache, suggest free venesection, with the internal administration of tartrate of antimony, either alone or combined with the saline cathartics. If repeated rigors succeed signs of inflammation, and especially if the patient becomes insensible, it may be presumed that pus has been effused; and the only chance of his recovery is afforded by perforating the cranium, so as to give the matter free vent, if it is lodged between the bone and the *dura mater*. If not found there it may exist deeper, but incisions in search of it would be quite unwarrantable. Puffiness of the scalp, and a glassy dry appearance of the wound, if there be one, have been insisted upon as important indications of suppuration of the *dura mater;* but they often exist in cases where there is nothing of the kind, and, therefore, ought not to be confided in.

The operation of perforating the skull is performed in this country with a Trephine or circular saw, to which the necessary rotatory motion is given by the hand. On the continent an older instrument named the Trepan, which works like a carpenter's brace, is still in use; and it is difficult to understand how the latter should ever have given place to the former, the use of which renders the process much more tedious and laborious. The only objection that can be alleged against the trepan is, the risk of its injuring the *dura mater* or brain; but the apprehension of this rests entirely upon theoretical grounds, as with moderate care, any chance of such an occurrence may be prevented. The patient should be laid on a support, low enough to render it unnecessary for the operator to elevate his arms in working the saw. If the bone is not sufficiently exposed by the original injury, a crucial or triangular incision must be made through the scalp, the flaps of which are then to be dissected back. The pericranium is next scraped off sufficiently to prevent it from impeding the teeth of the saw, which is applied at first with its center-pin protruded to keep it steady, and afterward, when a groove has been formed, this obstacle to its progress is removed. The sawing must be conducted cautiously, as the skull is not always equally thick, and is often throughout very thin, with hardly any perceptible diploe. A tooth-pick, or probe, should be introduced from time to time, to ascertain whether or no the bone is perforated at any part of the circle, and when the whole seems to be nearly cut through, a levator or forceps may be employed to raise the detached piece. If circumstances appear to require the removal of more bone, the same means are to be repeated, or the process may be accelerated, if the portion is extensive, by Hey's saw, as it is usually called, which proves convenient for connecting the circular apertures together so as to separate at once a large portion of the cranium. After the operation the wound is to be lightly dressed, and the general treatment conducted with the view of checking any tendency to inflammatory action. Cases admitting of this operation with any prospect of success are extremely rare, as the suppuration generally extends over a large surface of the membranes, or engages the substance of the brain.

Compression of the brain, when a consequence of external violence, is directly caused either by effusion of blood, or by depression of the skull. In both cases the symptoms are the same, and denote suspension of the cerebral functions, more or less complete. The patient lies as if in a profound sleep; his breathing is stertorous; his pulse slow and laboring; his pupils immovable, and in general dilated. He groans occasionally, winces under pressure applied to the injured part of his head, and frequently raises his hand to it. This state may continue, without suffering any material change, for a period of indefinite

length, from hours to weeks, or even months; but generally terminates in the course of a few days at farthest, either in a return to health, or in inflammation. Effusion of blood may take place between the skull and *dura mater*, on the surface of the brain, and into its substance. In all of these situations it depends on rupture of the vessels from concussion; and therefore, the symptoms of that kind of injury are at first generally associated with those of compression. As the symptoms of concussion, however, always go off soon, unless the brain has been lacerated, it may be concluded, if the patient remains insensible beyond an hour or two, that there is either an effusion of blood, or rupture of the cerebral substance. The latter case may be, in general, distinguished by the more complete insensibility, and other indications of suspended function which attend it, and by the early appearance of inflammatory symptoms. It seems that the effusion does not always occur immediately after the injury is sustained, but sometimes takes place gradually, so that there may be either no insensibility observable for a short period after the blow is inflicted, or an interval between the insensibility caused by concussion and that resulting from compression. In this case there can be no doubt as to compression being the cause of the symptoms. The quantity of blood effused is often very great, amounting to several ounces. Between the skull and *dura mater* it usually takes the form of a cake, of limited extent; on the surface of the brain it constitutes a thin crust or lining, widely spread over it; and in the substance of the organ it is generally coagulated at the center of the injured part, and diffused, in the form of ecchymosed spots, into the neighborhood. The largest accumulations of blood are met with between the *dura mater* and the anterior inferior angle of the parietal bone, where it seems to be effused from the meningeal artery. The extravasation, in general, takes place either immediately under the part subjected to violence, or on the side of the head opposite to it.

Depression of the cranium happens more readily in young than in old subjects; but produces less inconvenience in the former than the latter, owing to the yielding condition of the bones at their time of life, which allows the cavity, when diminished at one part, to expand in another. Where a preceptible depression exists, the symptoms may be fairly referred to the compression thus caused; since, when the case is broken, it is not likely that the contents should be so much shaken as when it remains entire.

It was formerly thought that the symptoms of compression peremtorily required the immediate performance of an operation, for raising the depressed portion of the skull, or affording vent to effused blood. The ample experience of a different practice, followed in modern surgery, has proved that in most cases, unless the substance of the brain

has suffered serious injury from concussion, the condition of the patient laboring under compression will not be altered for the worse, and in many will amend, if some days are allowed to elapse after the injury has been sustained, before proceeding to trepan the skull. The salutary change depends, no doubt, partly upon the effects of absorption—partly upon the brain becoming accommodated to the diminished size of its containing case; and it will be promoted by bleeding, active cathartics, and powerful injections thrown into the rectum. If the symptoms do not diminish, or if they increase, the operation must be performed; and the proper time for determining on it is regulated by the particular features of the case. Should depression of the skull be associated with a wound of the scalp, penetrating to the bone, a very short trial of the means calculated to supersede the necessity of an operation will be sufficient, as the fracture is already a compound one, and consequently not liable to be aggravated in this important respect by trepaning. On other occasions, two or three days may generally be allowed to pass without any bad consequences. In operating for depression of the cranium, the saw should be applied on the sound part, so as to remove the overlapping edge that prevents the broken portion from being raised into its place by a levator, or taken away altogether. If the blood effused is found under the *dura mater*, which then appears unusually tense and presents a bluish appearance, an opening ought not to be made through the membrane, since there is great danger in cutting into the cavity of the arachnoid, and little advantage is to be expected from doing so, as the blood in such a case is spread over an extensive surface, and the brain is in some measure relieved from the pressure by the aperture that has been formed in the bone.

Fractures of the cranium would be of very little consequence, were it not on account of their connection with injury of the organs which it contains. In reference to this, they may be conveniently divided into Fissures, Depressions, and Punctures.

A Fissure, as the name implies, is merely a solution of continuity in the bone, without any material displacement of the edges of the fracture. It is caused by diffused force acting directly, or transmitted to a distant part of the cranium by the intermediate portion remaining entire, and conducting it where the strength is less able to resist. The base of the cranium is generally the part broken in the latter way, or by *contre-coup*, as it is called; and the fissure usually extends through the cuneiform process of the occipital bone, transversely or obliquely backward. Bleeding from the ear often accompanies, though it does not necessarily proceed from a fissure of this kind. Fissures, as might be expected from the mode of their production, are in general followed either by speedy death, or by violent inflammation of the

cerebral substance and membranes. These bad consequences were attributed by the old surgeons to the split of the bone allowing noxious transudations from without inward, and their practice consisted in sawing away with the trepan, as far as they possibly could, all trace of the injured bone. In the more sound pathology of the present day, fissures are regarded as quite innocent, so far as regards their own effects—but as affording ground of unfavorable prognosis, by showing that the skull has been subjected to a great degree of concussion. They are, however, seldom known to exist until after death, since no one now thinks of searching for them, as was the custom formerly.

Fractures with depression result from the operation of forces acting on a somewhat extensive surface which gives way before them. The contents of the cranium are consequently not much shaken; and as the depressed portion presents its smooth side to the membrane, there is comparatively little risk of inflammation being excited in them. It has been already explained, in regard to compression, that it is not considered right in modern surgery to interfere by operation with such fractures, unless the symptoms denoting compression of the brain should be well marked, and persist after a moderate period, during which proper measures are employed, for promoting the accommodation of the organ to the alteration that has taken place in the shape and size of its containing case.

Punctured fractures are inflicted by sharp-pointed bodies, which apply their force with concentrated effect. They perforate, or beat in, a small portion of the external table of the skull, which acting on the more brittle, internal, or vitreous part, generally depresses it to a considerably greater extent, in the form of a flattened cone, the apex of which corresponds with the center of the injury. The sharp edges and points of bone thus driven inward, are apt to lacerate the membranes, or at all events, irritate them so as to excite inflammation. Sometimes the bad effects thus produced are of a chronic kind, and the patient may require an operation months or years after the injury has been sustained, on account of pain, discharge, or epilepsy proceeding from the irritation of a scale of bone pressing on the *dura mater* or brain. In the first instance, the injury is attended with little inconvenience, since the skull being broken, there is little concussion, and no internal effusion of blood, while the extent of bone depressed, though it may be considerable when compared with the size of the external wound, is never so great as to occasion any sensible degree of compression. But no fracture is really so dangerous, or so much entitled to attention on its own account, and it ought always to be regarded as requiring immediate operation. In performing this it is rarely necessary to convert a simple fracture into a compound one, as

the bone is in almost every case exposed by the blow that caused the injury. Sometimes the aperture is large enough to allow the broken pieces to be picked out; but more frequently it is necessary for this purpose to remove a circular portion by means of the trephine. The center-pin of the instrument should be fixed at the margin of the opening, as near as possible to the middle of the injured part. It is necessary to saw with caution, as the internal table is generally detached more or less extensively from the external one; and if the circumstances of the case are found to require it, the opening must be farther enlarged, either by re-applying the trephine, or using Hey's saw or cutting forceps. After the operation, the patient must be protected from all sources of excitement, and freely depleted, if threatenings of inflammation appear.

Wounds of the brain, unless very deep or extensive, are not immediately attended with any remarkable indications of the injury, except what may be presented to view by the part itself. The patient often walks, speaks, and conducts himself in other respects as if not materially hurt. Inflammation almost inevitably, however, soon comes on, and proving no less intense than uncontrollable, usually terminates fatally in the course of a day or two. The treatment ought to be directed with the view of preventing and checking these bad consequences, but will seldom be productive of much benefit, and therefore the prognosis in such cases is very unfavorable.

Hernia cerebri is a protrusion that frequently occurs, when the *dura mater* has been exposed or injured in consequence of external violence. The membrane becomes prominent, discolored, soft, and at length perforated by a small aperture, which enlarging, allows a fungous excrescence to expend itself. This growth is found on dissection to consist of a bloody mass, in which some traces of the cerebral substance can be discerned; and seems to resemble the fungus of the testicle that has been described above. It probably depends upon the brain having been injured by the concussion proceeding from the blow which caused the injury, and suffering in succession ecchymosis, inflammation, suppuration, and ulceration, which last mentioned action extending to the *dura mater* effects its perforation, and permits the soft substance of the brain to escape from the pressure which it sustains within the cranium, mixed with coagulated blood effused into its interstices, so as to present the appearance of a solid tumor. The treatment of *hernia cerebri* that proves most beneficial, consists in the free excision of the protruded mass on a level with the surface of the *dura mater*, and the subsequent application of pressure by means of lint, together with a plate of lead suited to the size of the aperture in the bone. With the assistance of such means the patient

sometimes recovers, but more frequently sinks under the irritation attending the disease.

The scalp is liable to various injuries, of which the first that may be mentioned are Bruises. The most common effect of these is the appearance of a firm round flat tumor, owing to effusion into the cellular substance, which takes place almost immediately after the blow is inflicted, and then gradually diminishes without any remedial measures, so as to leave, in the course of a few days, no trace of its existence. When the contusion is more severe, blood is effused under the integuments, so as to constitute a fluctuating swelling, the extent of which is very variable, from that of the point of a finger to a half or more of the surface of the cranium. This collection of fluid generally takes place gradually within a few hours, or, at most, a day or two after the accident, but sometimes does not appear until a week has elapsed. The edges of the scalp surrounding it are very firm, and somewhat thickened, whence there is some risk of erroneously supposing, from a careless examination, that the skull is depressed. The blood is usually absorbed either spontaneously, or under the influence of a discutient lotion, assisted by pressure, but occasionally excites sufficient irritation by its presence to cause the formation of an abscess. Should this change occur, a free opening must be made for the escape of the matter, and stimulating washes with a compress afterward applied; and, if the quantity of fluid effused in the first instance is very large, or does not soon show signs of being absorbed, it may be well in order to hasten the cure and prevent suppuration, to evacuate the cavity of its contents, and then carefully press its sides together. In some rare cases, one or more of the larger arterial branches are ruptured, and the tumor then not only fluctuates, but pulsates. External pressure is found quite ineffectual in checking the accumulation when proceeding from this source, and the only method of remedying it consists in laying open the cavity, sponging out the blood, and securing the injured vessels by ligature, or the application of compresses on their orifices. Bruises of the scalp, though perhaps apparently very trivial, are sometimes followed, at a distant date after the accident, by very disagreeable symptoms, denoting chronic inflammation of the pericranium, or *dura mater*. In such cases there are usually indications of constitutional derangement previous to the accident, and means proper for correcting this general disorder may be sufficient to remove the local complaint. But if the patient, after being subjected to an alterative course of diet and medicines, still suffers from painful sensations of the scalp, aggravated by pressure on the injured part, from headache and sickness, or from perversion of any function connected with cerebral organs, a crucial incision ought to be made down to the bone through the whole extent of the scalp affected, which

should be prevented from healing by the introduction of lint between its edges, and kept open as an issue, until it is closed by the contraction of the granulating process.

Wounds of the scalp are to be treated in accordance with the general principles that have been explained. The neighboring hairs should be always shaved clean away, and those more distant cut short to prevent them from insinuating themselves between the edges of the sore, collecting blood or other matters discharged from it, or impeding the application of dressings. If the scalp is detached from the bone in the form of a flap, it ought not to be cut away, as was done previous to the time of Mr. Pott, who showed the advantage of allowing nature to determine how far the part was rendered incapable of recovery. No inconvenience arises from replacing the flap in the first instance; and, if even a portion only of it should be saved, the cure will be greatly accelerated. When sand or other impurities are lodged in the wound, it must be carefully washed; and, if this proves insufficient, a cold poultice may be applied until the surface is freed from all foreign matters. All wounds of the scalp, but especially those of a punctured form, are apt to occasion extensive inflammation of the neighboring integuments. It would not be proper, by way of preventing this, to make any incisions in the first instance; but if the bad consequences in question should ensue, free dilatation, together with warm fomentations and poultices, ought to be employed without delay, while the general treatment of the patient is conducted so as to conduce to the soothing effect desired.

DISEASES OF THE COVERINGS AND CONTENTS OF THE CRANIUM.

Encysted tumors occur very frequently under the integuments of the scalp. They generally consist of a very thick, firm, almost cartilaginous cyst, which contains a mixture of fluid and pultaceous matter. When of this kind they are often not single, but exist together in several different parts of the head, particularly the region of the skull-cap. They vary in size from that of a walnut downward, and unless subjected to pressure or ulcerated, are very loosely connected, so that when a knife is thrust through the integuments and cyst in its long direction, the latter may be readily pulled away with the forceps, or turned out with the handle of the knife. Tumors of this sort are not unfrequently observed to be hereditary. More rarely, cysts of a thinner texture, and containing lardy-looking matter, generally intermixed with hairs, are met with in the scalp, chiefly at its lower and back part, near the neck. These adhere more firmly, and require to be dissected out. They often attain a very considerable size.

The only disease of the contents of the cranium, not depending on external injury, that has ever been subjected to surgical treatment, is

Hydrocephalus, or a morbid accumulation of fluid. The fluid is generally inclosed in the ventricles, but sometimes lies exterior to the surface of the brain, which is then usually more or less malformed. The disease is either acute or chronic; in the former case, occurring suddenly as a consequence of inflammatory action; and in the latter commencing insidiously without any such antecedent symptoms. Acute Hydrocephalus may take place at any period of life, but is most common in children. The quantity of fluid seldom exceeds an ounce or two, and death is caused probably not more by the pressure of the water than by the destruction of the cerebral substance occasioned by the inflammation which attends the effusion. The chronic form of the disease always commences in childhood, and is not unfrequently congenital. The accumulation of fluid slowly increases, and the bones of the cranium not being united, are separated by stretching of their connecting membranes, so as to allow the quantity at length to weigh several pounds, without much interfering with the functions of the brain, which becomes expanded into a bag-like form, and loses all trace of convolutions except on its inferior surface. The patient in such cases has the power of locomotion diminished, and his body becomes excessively attenuated; but existence is often prolonged for many years, and may at length terminate in a way not connected with the disease of the brain.

The great object in treating acute hydrocephalus is to subdue the primary inflammation, since the case is nearly hopeless when effusion takes place. It is evident that the mere removal of the effused fluid by operation, though it might for a little diminish the symptoms of pressure on the brain, could not afford any permanent advantage, and the operation for this purpose would necessarily be attended with the danger that attends all wounds of the cerebral substance. Few attempts have accordingly been made to cure the disease by puncture, and the results of these confirm the unfavorable opinion of the practice that was previously entertained on theoretical grounds.

In chronic hydrocephalus, the accumulation of fluid constitutes the whole of the morbid condition, and consequently evacuation of it may not appear an unreasonable mode of affording relief. The operation has, accordingly, been frequently performed, but not with such success as affords any encouragement to repeat it. This will not appear surprising, if it is recollected that, in all other dropsical swellings, paracentesis hardly ever affords more than temporary relief, and that, in the particular case under consideration, there are circumstances peculiarly opposed to a more permanent recovery. The unyielding nature of the parietes of the cranium, even though at some parts remaining in a membranous state, must equally prevent the complete removal of the fluid, and the employment of effectual compression afterward to

oppose its reproduction. No great risk seems to be incurred, in the first instance, since the wounds made by introducing the trocar have generally healed without producing any bad consequences, which may perhaps be accounted for by the thin expanded state of the cerebral substance, but the progress of the case is usually accelerated rather than checked.

INJURIES AND DISEASES OF THE SPINAL CANAL AND ITS CONTENTS.

The spinal cord is liable to concussion from blows and falls, particularly the latter, the symptoms of which are similar to those of concussion of the brain, inasmuch as they denote suspension of the functions usually exercised by this part of the nervous system. As these consist chiefly in conduction of the impressions producing sensation and voluntrary motion, the patient loses more or less completely the feeling and power of moving in all the portion of the body, which is supplied with nerves originating from the spinal cord, below the part where it has suffered from the external violence. The organ does not recover from this state of inaction so soon as the brain—a day or two, at least, almost always elapsing before any well-marked sign of improvement is perceptible. It is probable that the cause of this may be effusion of serum or blood, occurring in consequence of the injury, which, subsequently undergoing absorption, allows the usual actions to be restored.

In cases of this kind, the treatment, in the first instance, should consist merely in rest, and, if necessary, introducing the catheter to draw off the urine. The patient, though insensible to external stimuli, generally complains of uneasy feelings, sometimes amounting to intense pain, in the paralyzed part of his body; and if the state of his pulse, or other symptoms, such as flushing of the face, tenderness of the back to pressure, etc., should indicate the commencement of inflammation, general and local bleeding, warm fomentations, and purgative injections, must be assiduously employed to arrest the morbid process. After the acute symptoms have been subdued, and also in cases where the injury has not been primarily followed by them, the patient sometimes makes very slow progress in regaining the powers he has lost. Counter-irritation by blistering, tartrate of antimony ointment, or the actual cautery, then often proves extremely useful; while warm bathing, with friction, and attempts at exercise, are diligently used to excite the languid energies of the limbs.

The vertebræ are liable to dislocation and fracture, but never suffer in either of these ways without the operation of extreme violence, except in the cervical region, where the parts concerned are least firmly constructed, and sometimes suffer displacement from a degree of force not so very great. Dislocation seldom occurs unaccompanied by

fracture; and the medullary cord is almost always much injured at the time, independently of the pressure apt to be permanently caused on it by the disjointed or broken vertebræ. The symptoms resulting from such injuries are nearly the same as those of simple concussion or compression, and the distinction between them depends on the former being generally more severe, as well as obstinate, but chiefly in the alteration of shape which is discovered in the spinal column. It has been stated* that dislocation of the spine always terminates fatally, either in the first instance or in the course of a few months, owing to the chronic inflammation and alteration of structure occasioned by the injury; but this is not altogether correct, since recoveries in such circumstances do take place, though certainly very rarely. The prognosis, therefore, must be unfavorable.

The treatment does not admit of replacement of the dislocated surfaces through the agency of external means, and the removal of portions of bone by operation to facilitate reduction, though it has been attempted, offers no reasonable prospect of benefiting the patient, while it must increase the danger of bad consequences by adding to the irritation. The vertebral canal is so much wider than the nervous cord which it contains, that a mere alteration of its direction, even though pretty acute, could hardly produce any very important effect on the functions of the organ; and if the displacement were so great as to make the bones press injuriously upon it, there is every reason to suppose, that taking away the portions of vertebræ concerned, even granting it could be done without mischief, would be of no use in remedying the derangement of the structure of the cord. The patient, therefore, should be treated as if he had merely suffered concussion or compression. Symptoms of inflammation should be checked—the discharges from the rectum and bladder duly maintained — and if the immediate danger is surmounted, the means proper for subduing chronic disease at the injured part, should it be required, or for rousing the energies of the limbs, in case they remain defective in their power, must be carefully employed.

The only disease of the spinal marrow, that affords subject of surgical practice, is that sort of *Spina Bifida* in which the nervous parts are perfectly formed, but the membranes are distended with fluid so as to protrude through the aperture of the spine, and constitute an external tumor. The integuments at the part, which is usually the lumbar or sacral region, are generally thin, livid, and adherent. This disease is often associated with other congenital malformations, adverse to the duration of life, but when existing by itself, is not necessarily fatal. The thin parietes of the tumor sometimes ulcerate, so as to form a

* Sir A. Cooper on Dislocations and Fractures.

minute orifice, which, opening from time to time, allows the fluid to escape, and thus at length completes the cure. In imitation of this natural process, small punctures have been made with a needle (Sir A. Cooper), pressure being afterward carefully exercised, and the practice has occasionally proved successful. It is evident that the circumstances are here much more favorable for recovery after puncture than in the case of dropsy within the cranium, since the membranous nature of the sac which contains the water permits it to be readily compressed. The operation is still far from certain in its result, and ought not to be undertaken except when the child seems otherwise in a thriving state.

[Having had to treat a case of this disease last March, and it being one of much interest, I have concluded to make a few remarks upon it, as well as give the result of the treatment, being entirely new, as far as my observation goes.

The anatomical and pathological condition of this disease is now well understood by the profession, yet we find them differing materially as to the best plan of treatment to be pursued. Some have recommended pressure, others the ligature, the actual cautery, excision, and transfusion; all except the last have been practiced with so little success, that it is now considered almost one of the incurable diseases; for we find, upon examining all of our most authentic authors, that but very few cases are reported cured. Prof. Drake, in the Louisville Medical Journal, proposes to treat this disease upon the plan referred to above, by transfusion. I am not informed whether this has been used, but it really appears to be rational, and no doubt the supposition is worthy the consideration of the profession. It is as follows:

The general failure of the existing methods of treating spina bifida, may justify the suggestion of a new and different treatment. We beg leave to propose to the consideration of our brethren the following:

Let the cyst be emptied by a puncture, and then fill it with blood from the brachial vein, or temporal artery of the little patient. If practicable, cause the blood to flow from the vein or artery, into the sac, without cooling or being exposed to the air. If a small portion of the serum naturally contained in the cyst be left in its neck, none of the injected blood will enter the spinal theca. The mass of it will coagulate, its serum and coloring matter will be absorbed, or may be drawn off by a puncture, and the coagulated or concrete fibrin left behind. As fibrin thus situated, is susceptible of organization and adhesion to the surrounding tissues, it may be expected to undergo those changes in the cyst; and, according to its quantity, contribute to fill it up with solid matter. A second or third injection might be practiced if necessary. In this way, would not a solid tumor take the

place of one composed of serum? Might not the spinal orifice be thus closed up? And would not the tumor be gradually absorbed, at least in part? On principle, we do not see why this method should not be both safe and successful. It may be predicted, that it would excite a dangerous inflammation. But have we not many examples of extravasation of blood into serous and cellular cavities, even into the substance of the brain, without any dangerous irritation of the surrounding parts? Undoubtedly it would be pernicious to inject the sac, with any dead and foreign fluid, capable of hardening, but a mass of organizable fibrin, must not, in its effects upon the serous lining of the sac, be compared with a lump of unorganizable matter. Should any of our readers meet with a case of spina bifida, among our domestic animals, we hope they will give this method a trial; and should they have a case of the same kind in a child, which had resisted the usual treatment, and was likely to prove fatal, why should not this method be employed?

The blood might be taken from another young subject, than the patient. It should be caused to flow through the inverted intestine of a fowl; or be received into the inverted bladder of a recently killed animal, immersed in warm water. The less its contact with dead matter, the greater the probability of its becoming organized in the sac.

We hope to hear that some of our readers have tried this experiment.

The effect of opening these tumors, when allowed to remain so, has been convulsions and death in a short time, in all cases; hence many children have been killed by nurses and physicians, who did not really know the character of the tumor, and at once opened it, thus allowing not only the escape of the serous effusion which fills the sac, but also the atmosphere to come in contact with the brain; this, in my opinion, is the cause of the convulsions which usually follow the opening of the sac.

Why has excision failed to cure this disease? It is this: such an amount of fluid escapes that the parts cannot heal, even if there were sufficient time from the operation, until the convulsions begin, caused by the action of the atmosphere upon the brain; for the convulsions can be accounted for only upon this principle. Then, if this can be prevented, may it not be successfully treated? These reflections led me to adopt the plan pursued in the treatment of the case which I will give.

The case was a child seven months old; had spina bifida situated on the fourth cervical vertebra; being congenital, it grew but little until three months old, when it began to enlarge much; became inflamed and painful, and had the appearance of suppuration. The child appeared healthy in other respects. I proceeded to operate as

follows: Made a deep incision laterally above and below to the base of the tumor, and, as deep as the vertebra would allow, the spinal portion of the vertebra being imperfect—at the same time using as much compression with my thumb below as I could, and causing the assistant to do likewise above, the object of which was to prevent as far as possible, the escape of the fluid and the admission of the atmosphere. As soon as it was removed, and while holding the above position, the cut surface was made as dry as the nature of the case would admit, and together with the surrounding uncut integuments, filled with collodion, etc., then filled the entire incision and surrounding parts with collodion, made as thick as would flow, and upon this was placed strips of linen, over which more of the collodion was poured; this in a few moments became perfectly hard and dry; there was but a slight discharge at the time of its removal.

It was healed in ten days, having kept it covered all the time with the same dressing; the child is well, and there is no appearance of any return of the difficulty. Thus it may be seen, that the two great difficulties were overcome in this case, and I have no doubt may be in all others; the escape of the fluid and the prevention of spasms, by obstructing the passage of the atmosphere to the brain.

Fig. 136.



Fig. 137.



The above plates represent both the location and direction of the tumor.*

I have treated other cases upon the same plan and succeeded in a like manner, all of which are well to the present date, March 1857.—R. S. N.]

INJURIES AND DISEASES OF THE NERVES.

When a nerve is divided, the part to which it is distributed is immediately deprived of sensation and voluntary motion, and also suffers a diminution in the energy of its vital action, the consequences of which

* Eclectic Med. Jour., Oct., 1851.

are coldness, emaciation, and proneness to ulceration and sloughing. If the respective extremities are not separated to any great distance, they generally become united by a new formed substance, which, though it does not possess the characters of the nervous tissue, serves as a medium of communication between them. In some rare cases nervous fibrils have been traced from one extremity to the other. If a nerve is only partially divided, the wound is generally slow in healing, uneasy sensations are felt by the patient, who refers them to the part where the injured nerve is distributed, and the edges of the external sore are red, tumid, and extremely sensitive to external impressions. In such cases, warm fomentations, and other soothing means afford some relief; but the most effectual measure, for rendering it complete, is to cut the wounded nerve entirely across. When a foreign body is lodged in the substance of a nerve, the same symptoms that have just been mentioned are produced in an aggravated degree. Agonizing pain, and spasmodic contraction of the muscles are then induced, so as to make the patient willingly accept the severest terms for obtaining a release from his sufferings. Excision of the irritating body ought of course to be performed if practicable, and, if this cannot be done, amputation must be resorted to as the only remedy.

Symptoms very similar to those resulting from injury of a nerve sometimes occur without any local circumstances to account for them. The part affected is generally the face. The pain and spasmodic action of the muscles are not constant, but occur in paroxysms, which either come on spontaneously, or are induced by movement of the jaws, the operation of cold, heat, or stimulating food, and often mere mental emotion. This *Tic Douleureux*, as it is called, was formerly treated by dividing the nerve distributed to the affected part, and the *portio dura*, together with the three external branches of the fifth pair, were often cut across for this purpose. Relief generally followed the operation in the first instance, but seldom proved of more than very temporary duration, which might be owing to the communication of other nerves, the reunion of the one divided, or to the continued operation of the cause that occasioned the disease. This, as already observed, is not local, and seems to be generally constitutional derangement, depending on imperfect action of the digestive organs or excitement of the uterine system. The profession being now fully convinced of the inefficacy of dividing the nerves for *tic douleureux*, have abandoned all such attempts, and trust entirely in its treatment to the influence of regulated diet and regimen, together with medicines calculated to effect a beneficial alteration in the state of the general health. A succession of smart purgatives, especially croton oil, is often very useful; and the carbonate of iron, administered in

large doses, sometimes affords remarkable, though less frequently permanent benefit.

The nerves sometimes, but very rarely, become the seat of tumors. They are generally of a firm fibrous structure and yellowish color, but have been met with of a soft pulpy consistence. They seem to be formed in the interior of the nervous fasciculi, which can be traced over one or more sides of the swelling. They are generally smooth, round, or oval; and of a size intermediate between that of a pigeon and hen's egg. They occur most frequently in the large nervous cords of the superior extremity, between the elbow and shoulder, for the most part commence about the middle period of life, and are observed more rarely in females than males. They are usually the seat of more or less constant uneasiness; and when squeezed or otherwise irritated, occasion pain, with spasmodic twitching of the part to which the nerve affected is distributed. They are recognized by their symptoms, by their situation, and by their greater mobility in the transverse than longitudinal direction of the limb. The proper treatment of these tumors, as all external remedies are of no use, is to cut them out. The immediate effect of this operation is insensibility and paralysis of the part concerned; but, in the course of time, the patient generally recovers the powers thus lost; and, at all events, is freed from the annoyance of the disease, which is often so great as to render his life miserable.

Tumors in some respects of a similar kind, are not unfrequently met with at or near the extremities of nerves divided by amputation. The enlargement seldom attains a considerable size, being generally that of a pea or marble. It is extremely sensitive to external pressure, which excites intense pain, that is referred to the limb removed, and spasmodic contraction of the muscles of the stump, and the tumor, even though not mechanically irritated, is hardly ever free from uneasiness. The only remedy is removal, which may be effected either by simply excising the affected part, or performing a secondary amputation, which is the more eligible course, when the stump has been in other respects imperfectly formed.

The Subcutaneous Nervous Tubercle, as it is called, though not distinctly connected with the nerves, so far as can be traced by dissection, yet agrees so much in its symptoms with the tumors just described, that it certainly ought to be considered along with them. It is almost always about the size of a pea, smooth, round, or oval, and of a firm yellowish structure. It is seldom, if ever, observed to increase, being as large when first discovered, as it is found to be at any time afterward. It is seated immediately under the skin, which it slightly elevates; occurs on the inferior extremities much more frequently than on the superior; and is more rarely in males than

females, who are usually affected with it before middle age. In one case, the subject of which was a middle-aged lady, I found a tumor of this kind lying under the nail of the little finger. It is the seat of uneasy sensations, which suffer occasional paroxyms of exacerbation, sometimes periodically, but chiefly in consequence of excitement, either local or general. Emotions of the mind often produce this effect; and it is frequently observed, that the same circumstances which induce the attacks, when repeated, cause their sudden cessation. The only remedy for the disease is excision, which no less easily than quickly and safely relieves the patient from it.*

CHAPTER XXIII.

SKIN.

ERYTHEMA, ERYSIPELAS, AND ANTHRAX.

The Skin is liable to inflammation in consequence of very numerous and various irritations, direct as well as indirect. When proceeding from the former, it is either attended with merely local inconvenience, or, if sufficiently severe to disturb the system, occasions symptomatic fever, which presents the usual characters of that accompanying inflammatory affections. The morbid action of the part concerned does not tend to diffuse itself more extensively, and, according to the particular circumstances of the case, terminates in resolution, mortification, suppuration, effusion, ulceration, or diseased nutrition. Inflammation of the skin, resulting from indirect irritation through constitutional disturbance, is distinguished by some important differences, of which the most deserving of attention are its tendency to spread, and the peculiar nature of the disorder in other parts of the system that is connected with it. The terms Erythema, Erysipelas, and Anthrax, the last of which may include Carbuncle, Furuncle, and Boil, are used to denote the principal modifications which it presents. The first is applied to a very superficial redness, attended with hardly any perceptible swelling, evanescent on pressure being applied, having an extreme tendency to spread over the body, occasioning a hot burning sensation, and terminating in resolution. It is preceded and accompanied by great constitutional disturbance, being ushered in with prolonged and

* W. Wood, Med. Chirurg. Trans. of Edinburgh.

repeated rigors, sickness, and retching, which is sometimes almost incessant for several days together. The pulse is extremely quick, but not strong; the tongue is coated with a yellowish-white fur, inclining to be dry; the skin is very hot, often raising the thermometer to 140°; the patient complains of an insufferable burning sensation all over the body; his countenance has a yellow hue, and anxious expression; his mind is weak, and apt to wander. The mucous membranes of the lungs and intestines are often in an excited state, giving rise, by their increased secretion, to crepitation in breathing, and diarrhea. The disease is extremely distressing, and in general very obstinate, recurring again and again after the principal attack appears to have been subdued, but it does not often prove fatal. When death does ensue, it happens either from derangement of some internal organ, especially the brain and lungs, or from exhaustion caused by the continuance of the fever. Erythema is sometimes associated with an inflammatory state of the subjacent cellular substance, which is distended so as to cause a puffy sort of swelling, and generally soon afterward becomes the seat of purulent effusion, or not unfrequently of sloughing.

The disease generally appears in persons on the surface of whose bodies there is a solution of continuity. This may be either recent or of old standing, but the latter condition seems on the whole most favorable to attacks of the disease. The patient is rendered more liable to be attacked by having a bad constitution, or one disordered by an unhealthy mode of life. The grand exciting cause seems to be some peculiarity of the atmosphere, such as that existing in crowded, ill-ventilated hospitals, or even in open situations during particular seasons. In such circumstances, the wound, if recent, is often nearly healed before the erythema appears. The erythema commences in the neighborhood of the sore, and then leaving the skin there in its natural state, travels over the trunk or limbs, or nearly every part of the body in succession. There is hardly any treatment of a local kind that can be used with advantage. Leeching or cupping the inflamed part affords relief for the time, but seems to have no effect in arresting the progress of the disease. Of internal remedies, the most useful in the first instance are emetics, which sometimes appear to cut short the morbid process. The mercurial and saline purgatives, with gentle diaphoretics, should be frequently administered—blisters applied to the epigastrium seem very serviceable—and opiates have often a remarkably good effect in soothing the sensation of heat on the surface of the body, procuring sleep, and otherwise diminishing the uneasy symptoms of the disease. General bleeding can rarely be used with propriety, and stimulants are more frequently required, especially in the more advanced stage, when nutritive soups, wine, and opiates,

ought to be given freely and assiduously. In those cases where suppuration or sloughing of the cellular substance takes place, incisions must be made with freedom.

By Erysipelas is understood an inflammation of the skin, more deeply seated and less disposed to shift its place than erythema, and which tends to terminate in effusion of serum under the cuticle, elevating it into vesicles. The skin may be affected either alone or together with the subjacent cellular texture. In the former case the swelling, though distinctly perceptible, is slight, the surface is red, tense and glistening, and vesicles of variable size soon make their appearance. In the latter, which is styled phlegmonous erysipelas, the swelling is more considerable, but the other symptoms are the same; and the most important difference is established by the result, which is apt to be suppuration or sloughing. The constitutional disturbance, that precedes the appearance of erysipelas, is of the same kind as that which goes before erythema, but seldom proves so severe. The patient complains of headache, bad taste in his mouth, and coldness; and when the skin inflames, his general uneasiness, so far from increasing, generally diminishes very much, or entirely subsides.

The head is the part of the body most frequently affected by erysipelas, and along with the external inflammation, there are usually symptoms denoting an excited condition of the internal organs. The causes of erysipelas resemble those of erythema, but differ in so far that they depend more upon peculiarities of the individual. It occurs as often when there is no wound, as when there is one; and it is almost confined to those persons whose general health is previously deranged, particularly in regard to their biliary secretions, and by intemperance. In the treatment more benefit is derived from local remedies, and antiphlogistic measures of a general kind are more frequently required than those of a stimulating nature. When the head is concerned, blood should almost always be abstracted freely by venesection; and it is only when the patient's system is extremely weak that an opposite method ought to be pursued. A dilute solution of the tartrate of antimony, with the supertartrate of potass or with the saline purgatives, if given freely and frequently, so as to maintain a degree of nausea, with occasional vomiting and copious discharge from the bowels, exerts a powerful influence in subduing the disease. Of local means, those of a repellant kind, such as cold lotions, are considered unsafe, at least if they are used before the constitutional disorder has been removed. Bleeding from the inflamed surface affords the most decided benefit, and may be obtained by leeching, puncturing, or scarifying. It has been objected to the use of leeches, that it may excite irritation by the bites, but this inconvenience has not been experienced in practice. Punctures to the number of from ten to fifty, repeated once or

twice a day (Sir R. Dobson*), have been preferred by some as free from this objection, beside being more economical and convenient. Incisions of an inch or two in length, and made fairly down to the cellular texture (Copland Hutchison)† are of the greatest use in the phlegmonous form of the disease; both, in the first instance, by cutting short the inflammatory process, and also in the more advanced stage by facilitating the discharge of pus or sloughs. Longer incisions, equal in extent to the inflamed surface, and sometimes exceeding one or two feet, have been recommended (Lawrence),‡ but seem to have no advantage to compensate for their severity, and cannot be regarded as exempt from danger in systems not particularly strong. There are few cases that require incisions of any kind; and great mischief has resulted from their too indiscriminate employment. In persons who are very weak, and suffer intense pain, the best application is a warm solution of acetate of lead with opium. When there is much swelling of the part affected (Œdematous Erysipelas) pressure is found very beneficial, both before suppuration, and while sinuses exist after the matter is discharged. If sloughing takes place (Gangrenous Erysipelas), turpentine liniment, pressure, and stimulants, administered internally, are proper, until the dead parts are thrown off, after which a nutritive diet is all that the patient requires. The last mentioned form of the disease sometimes occurs with very acute symptoms, and runs its course in despite of every sort of treatment, so as to terminate fatally within a week from its commencement. It generally originates from some slight local injury, such as a prick or scratch, but occasionally commences without any breach of the surface having been sustained. It is always preceded by, and accompanied with, extreme constitutional disturbance, of which the most remarkable features are excessive rapidity of the pulse, great frequency of respiration, want of sleep, anxiety, dusky complexion, and dark color of the tongue, lips, etc. Free incisions, hot fomentations, calomel with opium, administered internally, and a liberal allowance of wine or other stimulants, are the means best calculated to afford relief in this most alarming state, which may be regarded from the first as all but incurable.

[The treatment of Mr. Syme, with the exception of his bloodletting and mercurializing, I fully adopt. When the pulse is full and frequent use the veratrin in small doses; this, in combination with asclepin and gelsemin, may be relied upon to control the heart's action without depleting; these may be pushed as far and as fast as the nature of the case may require.

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* Med. Chirurg. Trans. Vol. xiv, p. 206.
† Ibid. Vol. v. ‡ Ibid. Vol. xiv.

If pus has not formed, pencil the parts twice a day with the muriated tincture of iron, which may be applied of full strength or diluted with water one half; this should be continued until the swelling of the parts shows evidence of subsiding. Then omit for one or two days, and repeat if necessary.

If pus has formed, or vesication taken place, and manifests a disposition to extend, apply the pulv. sulph. zinc over the vesicated parts, or inject a saturated solution into the abscess, until the parts cease to suppurate, after which the water dressing may be used until the structure destroyed by the zinc sloughs off; then, as a general thing, it heals rapidly by granulation.

The greatest indication in the treatment of this disease, in all its stages, is the perfect restoration of the function of the skin; this should never be forgotten or neglected.—R. S. N.]

By Anthrax or Carbuncle, and Furunculus or Boil, are implied different degrees of a similar affection of the skin, consisting in an inflammation fixed to the part where it occurs, but tending to spread in its extent, attended with intense pain, and terminating in suppuration, with more or less sloughing. The disease is met with of all sizes, from that of a pea to that of a plate. It occurs, when large, generally on the posterior surface of the trunk between the occiput and sacrum, and, if small, chiefly on the face and hands. In other parts of the body it usually attains an intermediate size. There is usually little swelling, but great induration. Small apertures take place spontaneously in the progress of the disease, but as these depend on detached suppurations in the substance of the thickened cutis, they prove quite useless for allowing the matter and sloughs to escape. The irritation consequently continues—the disease enlarges its area—and if of large size, or seated in a weakly subject, may at length prove fatal. In general, the disease is more distressing than dangerous. It is always preceded by derangement of the system, though it frequently happens that no marked symptom of this attracts attention, until the local appearances present themselves. A state of too full health, or assimilation of food disproportioned to the patient's exercise, and also an irritable state induced by intemperance, and derangement of the biliary secretion, are the conditions most favorable for producing the disease. It often exists in various parts of the body at the same time, or occurs in them successively. It is always accompanied with feverish disturbance, proportioned to the extent and acuteness of the local symptoms.

The treatment of all the degrees of this affection should be conducted on the same principles. The first of these is to relieve tension, bleed from the part, and afford free vent to the confined matters, by making a free crucial incision completely through the integuments to

the full extent of the disease—the next is, to promote the cleaning of the cavity, by applying soft poultices—and the third is, to correct the predisposing states of the system, which appear to have induced the morbid action, by bleeding, purging, soothing, or stimulating, according to the circumstances of the case. When the boils are numerous and small, the local treatment that has been recommended would be more severe than the disease warrants, and may therefore be omitted, while the constitutional means are diligently employed. In the opposite extreme, where the carbuncle is of great extent, it is of the utmost consequence to proceed in the most efficient manner for subduing the local disease, and not only make free incisions in the first instance, but repeat them from time to time, if the inflammation should still at any part threaten to extend.

[In many cases the caustic potash may be injected into all the sinuses with impunity. I have often produced perfect relief to the patient by a solution of the caustic, which should be used until the parts are disorganized; then apply the sulphate of zinc until all the structure, which has been under the influence of the potash, becomes hard and dry; then apply water dressing or the ulmus fulva, until it sloughs; it heals without any further difficulty. If the reaction is great, use quinine and iron, with anodynes if necessary.—R. S. N.]

CHRONIC CUTANEOUS DISEASES.

Under the title of Cutaneous Diseases may be comprehended a great number of affections, apparently very dissimilar from each other, but which are found to differ chiefly in appearance, and in general to agree very closely in regard to the cause of their production, as well as the mode of their remedy. They all consist in the existence of some chronic preternatural condition of the skin, and have been arranged into divisions, according to the nature of it. Of these the most important are the Papular, in which the surface is elevated into little pimples—the Pustular, which consist in small collections of matter—the Vesicular, in which the cuticle is elevated by small quantities of fluid effused under it—and the Squamous, in which the cuticle is rendered thick and scaly. The species and varieties of these different kinds, and others that have been noticed, are so numerous, that the most concise description of their distinctive characters would require far more space than can be afforded for the purpose in this work, to which, it may be observed, they do not strictly belong, since, though external in their situation, they are remedied chiefly by internal means.

They originate in the first instance, with few exceptions, from constitutional disturbance, but frequently become so naturalized to the system, as to continue after the derangement that gave rise to them has ceased to exist. Disorder of the digestive organs is the grand

source of their production, and they may be regarded as bearing the same relation to chronic conditions of this kind, that erysipelas or erythema does to those of an acute form. The circumstances that occasion this disturbance of the abdominal viscera are very various, and many of them were wont to be regarded as the immediate causes of cutaneous disease; but it will be found that they are not truly so, having always interposed, between their operation and the affection of the skin, some derangement of the digestive functions, which ought more properly to be considered the cause of the disease. In the treatment it is often sufficient to restore the general health, but more frequently it is necessary to conjoin local means with those employed for this purpose, since, as has been already observed, the morbid action of the skin is apt to become habitual, and to continue after the derangement in other parts of the system that gave rise to it has ceased to operate. For correcting the depraved condition of body, all errors of diet must be carefully ascertained and interdicted. The food should be easily digestible, but small in quantity. Bleeding and purging may be used if there seems to be a tendency to plethora. Regular exercise and an alterative course of mercury, with the saline cathartics, or some mineral water of this kind, are then to be prescribed. In the treatment of scaly eruptions great benefit is derived from the use of corrosive sublimate and Fowler's solution of arsenic; and from the combinations of iodine with mercury and arsenic. Of local means, the one most generally useful is frequent ablution with warm water and soap. Water impregnated with sulphur, such as that existing naturally at Harrogate and elsewhere, or prepared artificially by dissolving a small proportion of sulphate of potass with sulphur, usually proves more beneficial. If there are any hairs at the part, they ought to be removed, as their presence is not only a constant source of irritation, but prevents the measures for cleansing it from being employed efficiently.

Of medicinal applications, the best are citrine ointment diluted with axunge or *linimentum acquae calcis*, in the proportion of one part to four or six; an ointment containing sulphur and axunge in the proportion of one to eight; a mixture of the two last mentioned; a solution of the sulphuret of potass, or hydro-sulphuret of ammonia; and other ointments or solutions of a stimulating kind.

Warty excrescences of the skin are of very frequent occurrence, particularly on the face and hands. In the latter situation, they are simple extensions of the natural texture, and prove inconvenient merely from the deformity and awkwardness in using the fingers, occasioned by their presence; but in the former, they consist of formations altogether foreign to that of the skin, and beside being unseemly, are apt, in the more advanced period of life, to take on malignant action, either

in consequence of being irritated, or spontaneously. They generally appear on the hands during the period that intervenes between childhood and puberty, and are seldom met with in adults. They may, if it is desired, be removed at once by the knife, caustic, or ligature, of which means the one first mentioned is the best; but are in general readily dispersed by the more gentle method of exciting their absorption, by applying some stimulating ointment or lotion. Strong acetic acid answers very well for this purpose, if applied every second or third day. When they are seated on the face, caustic, and all other applications likely to excite irritation, should be carefully withheld from them; and if itching, pain, or increasing size at any time indicates activity, and probable perversion of their nutritive action, excision ought to be immediately performed.

Corns consist of a thickening or induration of the cuticle, induced by pressure, which excites the secreting action of the cutis. The toes, particularly on their lateral aspect, are most liable to this occurrence; and it appears that there is great variety in the predisposition to the disease, which is possessed by different individuals. The symptoms of a corn are precisely what a foreign body of similar size and consistence would produce, if placed in the same situation. They may be palliated by slicing off the most projecting part of the induration, by wearing wide shoes, or avoiding walking. The radical cure is often attempted by detaching the corn from its matrix by means of a pointed and flat, but not sharp-edged instrument—which may be done very completely without bleeding, is always followed by great relief, and sometimes proves permanently effectual. A better method is to soften the corn by touching it with acetic acid again and again until the whole is scraped out, and then apply the nitrate of silver to the exposed surface of the cutis, to destroy its morbid secreting tendency.

Corns are occasionally not hard, but soft, the cuticle constituting them being white and moist. These *soft corns*, as they are generally, though not very correctly, termed, usually prove more troublesome than the others. They cannot be detached entirely—and are apt to inflame, suppurate, and form obstinate sores, if subjected to irritation. Astringent applications, such as that formed by mixing together equal parts of alum and the white of eggs, often afford great relief.

[I consider the sulphate of iron and the sulphate of zinc preferable to the arsenic and mercury in any form.—R. S. N.]

DISEASES OF THE FINGERS AND TOES.

The Nail of the great toe often occasions much distress, by becoming imbedded at one or both of its edges in the soft parts, instead of

lying over and protecting them. This *growing in* of the nail, as it is termed, depends originally in most cases on the pressure of a tight shoe, or on the projecting corners of the nail having been broken off accidentally, or cut away intentionally, with the erroneous view of preventing them from entering the flesh, since they are much more apt to do so when thus rounded off, than when left in their natural shape. After the edge of the nail has effected an ulcerated breach, it prevents any step toward reparation, by causing irritation, which inflames and thickens the soft parts concerned, so as to make them overlap more and more. Various methods were formerly employed in the treatment of this complaint, which seldom did more than afford temporary palliation; of these may be mentioned, cutting away the overhanging edge of skin, touching the ulcerated surface with caustic to destroy its morbid sensibility, interposing a plate of some sort between the edge of the nail and the ulcer, and scraping away the morbid part of the nail so as to make it very thin, in order to diminish the force with which it pressed upon the raw surface. M. Dupuytren devised an easy and effectual mode of treatment, which has superseded all the others.* This is to remove all that part of the nail which is connected with the ulcer—an operation that may be effected more readily than might be expected, by thrusting one blade of a pair of strong scissors close under the nail, and dividing it quite up to the root, after which the portion that is to be removed being firmly seized with forceps, is twisted out with great ease. Should the nail be exciting irritation at both edges, it will be best to take away the whole of it, for which purpose the preliminary division ought to be made exactly in the middle. The wound should be dressed simply, and heals in a few days, in so far as to acquire a cuticular covering. The nail then gradually extends over the surface it formerly occupied, and, unless subjected to improper pressure, occasions no farther inconvenience.

[Scraping the nail upon the top until it becomes thin, then pushing raw cotton or lint under every part of it, as far as possible without inducing much pain, allowing the nail to grow as long as you can without paring it, often relieves the difficulty. If the nail has grown so far into the soft structure as not to permit the above treatment, apply the caustic silver, after dipping it into water, over that portion of the nail which is to be removed. Apply this twice a day, and it will so destroy the nail as to admit of its removal with a pair of scissors without pain. To prevent a recurrence of the difficulty, apply to the wound the sulphate of iron until the parts generating the nail are destroyed.—R. S. N.]

Small Exostoses occasionally grow from the distal phalanx of the

† Repertorre d'Anatomie et de Physiologie, T. i.

great toe, and also, but very seldom, from those of the other toes. They generally form a tumor under the edge or extremity of the nail, and sooner or later seriously impede the use of the foot. The nail, if necessary, having been removed, an incision should be made, first on one side, and then on the other, so as to embrace the root of the growth, and divide the soft parts covering it, after which it may be readily detached by strong scissors or cutting forceps.

Onychia is an obstinate ulcer seated in the vascular structure that lies under the nail, and envelops its root. It is of small size at first, but gradually spreads so as to engage the whole extent usually covered by the nail. The surface is brown and glossy, the discharge excessively fetid, and the pain intense. The nail is formed very imperfectly, and either remains dry, black, and loosely adherent, or presents merely a small vestige of its root, which is thick, white, soft, and connected by a broad base with its secreting matrix. The surrounding skin is tense and inflamed, and, in cases of long standing, the texture of the subjacent bone is sometimes greatly expanded.

This disease occurs most frequently in children, but is met with at all periods of life, and in the fingers much more frequently than in the toes. It is occasionally referred to local injury, but perhaps always depends on derangement of the general health. After being established, it exists as an independent disease, and seldom, if ever, can be remedied by means that operate on the system at a distance from the part affected. The treatment requires, in the first instance, that the nail should be completely eradicated, then the application of the black-wash, or a solution of arseniate of potass; and, while these means are employed, an alterative course of medicine to improve the patient's health. If the ulcer resists, it must be touched with caustic potass, or extirpated by knife, by two similunar incisions being made, the one within the other, and meeting at their extremities so as to include the whole extent of the vascular membrane that surrounds the root of the nail—or amputation may be performed, if the digit is of little use, as when one of the smaller toes is affected.

[If the nail has to be removed, apply the nitrate of silver, as before directed, when it can be removed with little pain.—R. S. N.]

Paronychia or Whitlow, denotes an acute inflammation of the finger, generally resulting from local irritation operating on an irritable constitution. The disease is sometimes confined to the soft parts, sometimes engages the tendons or their sheaths, and sometimes affects the bones. In all cases the best practice is to make a free incision as soon as possible through the seat of the disease, which is almost invariably on the palmar aspect. When the fibrous tissues slough, the dead parts ought to be carefully withdrawn so soon as they are loose, since their presence acts powerfully in keeping up irritation. Leeches,

warm fomentations, and poultices, are often productive of great harm in the treatment of paronychia, by diverting attention from the only and essential mode of affording relief—namely, incision. After the parts are freely divided, a poultice may be applied for a few days, but not longer, as its relaxing effect, if continued, proves injurious, and some stimulating dressing with pressure ought then to be used. When the tendons or bones are destroyed, amputation must be performed, as the finger, even though it might be healed, could not be of any service to the patient. Exfoliation of the distal phalanx, which frequently occurs, does not require the same proceeding, as the finger, though somewhat shortened by it, is not materially impaired either in appearance or utility.

The Palmer Fascia, on the ulnar side of the hand, is liable to contraction, attended with thickening, which produces more or less complete and permanent flexion of the little and ring fingers. This affection occurs in young and middle-aged persons of both sexes, but in males more frequently than females. It seems to be induced by violent exertion and pressure of the hand. All kinds of external applications have been found quite unavailing in its treatment, and the only mode of affording relief is to cut across the contracted fibers, and then extend the finger on a splint. The division should be effected by subcutaneous incision—for which purpose a needle with a sharp cutting edge answers best. The small toes are liable to a similar affection, which is extremely inconvenient in walking. It might, perhaps, be remedied in the same manner, but as it may be removed at once by amputation without any serious loss to the patient, this mode of relief should be preferred.

[Dunglison's Dictionary says that whitlow is of "four kinds: 1. That seated between the epidermis and skin. 2. That seated in the subcutaneous areolar tissue. 3. That occupying the sheath of a tendon; and 4. That considered to be seated between the periosteum and bone. The last three are only different degrees of the same disease. The inflammation generally commences in the subcutaneous areolar tissue, and spreads to other parts."

We cannot agree with this opinion; we think that each of the kinds begins originally in its own peculiar position. Dr. Miller says, in his Practice of Surgery, that there is reason to believe that the worst form of the disease originates in the periosteum, or immediately exterior to it.

All the forms of this disease are exceedingly painful. The reason is to be sought in the extraordinary expansion of the sensitive nerves upon the extremities of the fingers, and the unyielding character of their integuments and fasciæ. The patient, with a severe form of it, suffers for many days and nights without sleep, from painful tension

and throbbing in the part. The attending inflammatory fever is sometimes severe, particularly after the formation of pus, which is always an early event in its history.

In those in whom the absorbing system is rather slow or dilatory, or the exhalent is active, the swelling extends to the back of the hand and sometimes the whole of the fore-arm, and is attended with considerable heat and redness. The deep seated varieties of this disease are not only always attended with much suffering, but of much danger to the integrity of the affected member, more particularly in an inactive absorbing system; the bones of the articulations become carious, the tendons slough away, and amputation becomes indispensable. In more favorable constitutions the part may not be destroyed, but rendered deformed, anchylosed, and useless. In these remarks we suppose the malady to be neglected or maltreated, or to happen in very strumous constitutions.

Dr. Miller's Surgery teaches that, "at the out-set, active antiphlogistics, locally and generally, are to be employed—copious leeching, fomentation, and poultice, purging and antimony—with the hope of arresting suppuration. Failing these, there is no relief to suffering, and no means of arresting serious destruction of texture, but by early and free incision," which Prof. Dunglison says, should be carried to the bone if the disease be supposed to be seated about the periosteum.

The preceding, or its equivalent, is the practice we have ever seen recommended for the cure of this painful affection; and a few words will show that it must be, as it usually is, very ineffectual.

General or constitutional treatment can only affect the general consequences of the local affection, because of its distant removal from all of the great centers of constitutional action, and in consequence of the dense and unyielding character of all the tissues that constitute the seat of the disease—as little can be expected from the local treatment recommened as from the constitutional.

We do not remember to have ever tried this practice, but we have seen much of it that either was or had been in the hands of others, and the results were never such as to induce us to try it.

The fundamental principle of our treatment we obtained from Prof. Dudley, when a student in the university at Lexington, Ky., but our application of it, which in twenty-eight years has been quite extensive, so far as we know is entirely our own. Our unfailing success with it has urged us to place it before the public.

In order to render our treatment the more perspicuous we shall divide the disease into three stages; the *incipient*, *advanced*, and *suppurative*.

The incipient stage comprises the first few hours, or even a day or so, depending upon the activity of the disease; the patient, however,

complains of pain and soreness in the part—thinks it possible that he may have pricked it with a briar or a splinter. If at this time, or even shortly after, its true character shall become suspected, our practice is, without any concern as to whether it is superficial or deep seated, to apply a roller of thin muslin, made wet with thin plain paste, and as the part is not at this time much swollen, we are careful not to apply it so tight as to be uncomfortable, because it will become so, in a short time after the bandage shall become dry and unyielding. When the capacity of the bandage shall become thoroughly filled by the advancing tumefaction, considerable pain will be experienced for an hour or more, or until reaction shall have commenced, and then there is no more pain, if the application have been properly made. We are now supposing the constitution to be an ordinarily active one, but when it is of a contrary character, the period of pain may be much extended. The bandage, however, is not to be removed until the cure is effected. To mitigate the violence of the pain, narcotics or stimulants, or both, may become requisite, at least, advisable.

As moisture will soften and relax the bandage, when prepared as above described, and thereby render it unequal in its pressure, and consequently mischievous in its application, it is far preferable for those whose obligations require that the afflicted part shall be exposed to wet and moisture, indeed it is indispensable that the character of the bandage shall be such as to resist the influence of water. In such cases we merely use a wet roller, and when it shall have become dry on the part, we saturate it with a strong alcoholic solution of gum shelac, which renders it not only waterproof, but so hard and unyielding that no ordinary accident can hurt the part—it forms a complete protection. With a finger thus dressed, a negro can return to the cotton field, and the cook to her kitchen and slops, and continue their respective duties. In healthy constitutions this application will usually conquer the disease in twenty-four hours, but it is always best that the bandage should be worn several days longer than the patient may think it necessary.

In the *advanced stage* the part is so swollen and so excruciatingly painful that the patient can neither eat nor sleep, nor yet be still in any position. Suppuration may or may not have commenced—the fact cannot certainly be ascertained, and if it could, the treatment would not be modified. In this stage, the bandage being prepared as before stated, must be applied with considerable force, which can be readily done with very little pain, by taking the finger into the hand and gradually forcing the blood out of it, before applying the bandage. As it is now more difficult to establish reaction than it was in the first stage, the pain resulting from an arrestation of the pernicious action of the part, will be, possibly, more severe and protracted, but

reaction is at length established, the pain ceases, and in twelve or fourteen hours the bandage will have become so loose as to require a readjustment, which may become necessary two or three times before a cure is effected. Suppuration had not commenced as the sequel demonstrates.

When the physician first sees the patient, he discovers that the malady has been neglected, or that it had refused to yield to the treatment that had been adopted, for he discovers that the suppurative stage is unquestionably established. The bandage is applied as in the second stage, and, as in that stage it may, in consequence of an absorption of effused serum, become loose and require adjustment. In establishing a change of action in the part at this time, the pain will become as nearly insupportable as possible; but in several hours it ceases, and in a day or two the pus may be discharged by the point of a lancet or a needle, and in a few days more the part is well. After the escape of the pus, the bandage should be continued, but a little hole should be made in it, to permit the escape of the pus that may be produced.

That the reader may be prepared for what he may probably have to treat, in the course of much medical practice, we will introduce the first case we ever treated in the third stage by our practice, and the worst case we ever saw:

Mr. E——, a jeweler, of rather a lax fiber, was attacked with paronychia in the palmer aspect of the thumb-joint of the right hand. In the advanced, and also in the earlier part of the suppurative stage, several of his medical friends advised him to have an incision made into it; he refused and persisted in refusing, although he was assured that he would lose his thumb if he did not.

The thumb was swelled to about six inches in circumference—contained pus, and was exceedingly painful. We applied the bandage pretty tightly, the pain became so greatly increased, that we gave him during the night (the dressing was applied after dark a little while) four grains of opium (morphine was not then known) and a pint of French brandy, without producing either stupor or undue excitement. On the next morning he was clear of pain; by the evening of the next day the pus appeared near the surface and was discharged, and in a week more the thumb was well—without stiffness or deformity, and so continued twenty years to our knowledge.

In some instances the hand and fore-arm become much inflamed and swollen. We had one case of this kind in a lazy and scrofulous constitution, in which we had to bandage all the fingers, the hand and the arm to the elbow; under any other treatment we are persuaded that the finger would have been lost.

It must now be remembered that the general treatment universally prescribed in this form of inflammation, consists of "purging and

antimony." In all cases of the phlegmasia, of a favorable character constipation of the bowels attends the inflammation, and when the contrary is the case the prognosis is unfavorable. Now is it proper for us to do that, under the circumstances, which the *vis medicatrix naturæ* would not do, if it had the power to do the best? If constipation pretty generally, in good constitutions, succeed to important injuries and to the fever consequent upon inflammation, should we infer that it is in obedience to a law which we should obey and not violate? We hold this to be a vital law, and one that demands of us the most strict obedience.

Obstruction or cause of disease has become lodged in a part, and the ordinary power of the part cannot remove it—a tax is levied upon the system, or parts of it that can least bear it—the power of their functions is reduced, and for what? To enable other parts to expel a cause of disease. In other words, no system can maintain two superior or major actions. When, therefore, it becomes necessary that the power or function of the arterial system should become increased, that of the bowels must be decreased. In purging, do we not diminish the action of the arterial system? This is not equalizing the circulation—it is drawing it to one particular part from another particular part. In giving antimony there is more good sense, because it diminishes arterial action and does not increase in any other one part, but enables the capillaries to empty themselves. Is it not notorious that fractured bones are sometimes prevented from uniting by purging, bleeding, starving, etc.? If a full habit and an empty one, or anemia, be both opposed to recuperative action, who can or has discovered the desirable intermediate one point?

In view of these considerations we would suggest that unless there exists the most satisfactory evidence that the alvine contents are producing general irritation, it is the best to let them alone; and in the case before us, nauseants can do but little good. The patient has too much pain to eat, and hence the digestive system can spare some of its fuctional power to aid the arterial to remove the cause of disease out of the finger. We have never as yet discovered in this form of disease, any need of constitutional treatment, further than to lessen the animal sensibility for the time being.

We have had to treat cases of this painful affection in both sexes, of almost all ages, and in all its stages and varieties, and yet we have not had necrosis, anchylosis, or deformity to result in a single instance. But as simple as the treatment appears to be, and really is, it requires some practice and considerable care to apply properly the bandage, more particularly in the second and third stages; the pressure it makes must be equal at every point, and it should always be extended from the extremity of the finger to its junction with the

hand. The greatest care should be observed to render the pressure unyielding about the extremity, otherwise, strangulation and sphacelation may be the result.

The physician will find it very difficult to secure obedience from that class of persons who are the most frequent sufferers—servants—those in whose calendar the *present tense* alone is to be found, more especially when the organ of animal sensibility is much developed. When reaction in the part is being established, the pain is very considerable, and to obtain present relief they are very apt to remove the bandage, and thereby, as we have generally thought, render the case worse than it would have been if it had not been applied. The most obstinate cases we have met with, have been among the German and Irish servants; and yet we never had a case to continue to disqualify the patient for business as many weeks as we have known the usual treatment to require months, and then possibly a joint is amputated.

We have never known a case of this disease to occur in those who possess a dense and active muscular fiber—those whose tissues, generally, are firm and resisting. When the cause of the disease is inflicted upon such a tissue, whether by cold or mechanical violence, the surrounding resistance forces depuration, and it is removed, and as this cannot be effected in lax tissues, the bandage furnishes the necessary resistance—it does for the part in the first and second stages, what it could not do for itself. This reasoning satisfies us, but it may not others; nevertheless, it is certain, that no further capillary engorgement can be effected in the part, consequently there can be no further increase of temperature or swelling—the morbid process is arrested, and recovery must succeed.

The application of the bandage in the third stage is equally felicitous; it increases the pus-forming destruction of tissue, and thereby promotes, incomparably more than poultices can, an egress of the pus; and when this is effected, it forces the walls of the abscess into contact and thus effects adhesion, and consequently an avoidance of the tedious process of granulation.

We have said that the bandage promotes the pus-forming destruction of tissue, but this is only true in a qualified sense. Under the operation of the resistance, the distance to be broken down is short, and the work is effected in a direct manner; hence, in the abstract, the quantity of destruction under the usual treatment is probably fifty times greater before a cure is effected.

The usual treatment is not in harmony with what nature would do, but with what she is forced, by her weakness, to do. The capillary invasion, effusion, tumefaction, and suppuration are all consequences of the defective resistance. Purging reduces generally the power of resistance, and poultices reduce it locally and consequently promote a

more extensive and wide-spread suppuration. The knife gives relief by a destruction of the resistance, while the bandage does it by so increasing it as to thoroughly arrest the invasion. The former procrastinates recovery, promotes a waste of structure, and finally hazards the safety of the part, while the latter abridges suffering, a waste of tissue, and the final hazard.*

I have succeeded in several cases as recommended by Professor Powell. Injections of the saturated solution of sulph. zinc answer well in many cases, also the free use of the sesquicarb. potass.—R. S. N.]

CHAPTER XXIV.

THE EYE AND ITS APPENDAGES.

INFLAMMATION OF THE CONJUNCTIVA.

The conjunctival covering of the eye and eyelids is very liable to inflammation, in consequence of a great variety of irritations, both direct and indirect. Bright light, intense heat, cold wind, acrid fumes, dust and foreign bodies of all kinds introduced under the eyelids, produce inflammatory symptoms more or less severe, according to the irritability of the individual, and the degree of irritation. The suppression of accustomed secretions through the operation of cold or any other cause, is also a fruitful source of such attacks. The proneness to this inflammation is remarkably increased by habit.

In considering the symptoms of the disease, it is necessary to divide them into acute and chronic. The former are: 1. Redness and turgescence of the conjunctiva, the surface of which is everywhere covered with arborescent vessels; 2. Swelling of the eyelids, and watering of the eye; 3. Intolerance of light; 4. Pain of the eyeball and forehead; 5. Symptomatic fever. The characters of the chronic form are moderate redness without tumefaction, weakness of the eye when employed for vision, and a disagreeable sensation, as if from the presence of some granular body under the eyelids. Between these extremes there are innumerable shades of difference in the severity of the symptoms, according to the peculiarities of particular cases. When the inflammation is very intense, the turgescence of the conjunctiva is sometimes so great, as to cause an obvious swelling of the

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* Eclectic Med. Jour.

membrane, which is named Chemosis. It depends on effusion into loose subjacent cellular texture, partially conceals the cornea, and may even evert the eyelids. The chronic condition almost always remains as a consequence of the acute one, and when it exists independently of this origin, generally proceeds from some chronic source of irritation, either direct or indirect, as inversion of the eyelashes, or derangement of the digestive organs.

The treatment requires, in the first place, that the eye should be relieved and protected from all sources of irritation. Foreign bodies, if suspected, must be searched for and removed, the eyelids, if necessary, being everted, so as to bring the whole extent of their mucous surface into view. Workmen employed in forging or grinding iron are exposed to the entrance of small sparks from the metal into the eye where they generally fix themselves in the conjunctival lining of the cornea, and, unless speedily wiped off, are apt to become imbedded in its substance, where, being extremely small, they may remain a long while producing irritation without being discovered. The light of the patient's room should be obscured, and he ought to abstain from all attempts to use the organ. Free evacuation of the bowels by mercurial or saline purgatives, leeches applied to the neighborhood of the eye, and warm fomentations frequently repeated, are the means of most use. If fever exists, general bleeding, in sufficient quantity to produce a decided effect on the system, should be employed. The blood may be taken either from the arm or temporal artery, but seems to be abstracted most beneficially in the former mode. When the chemosis is so great as to impede the closing of the eyelids, some portions of the distended membrane may be cut off with scissors, which relieves the distension, and tends also to subdue the inflammatory action. After the intensity of the symptoms has subsided, and they assume the chronic character, or if they appear in this form from the commencement of the attack, decided benefit is usually derived from introducing into the eye once a day, a dilute solution of the nitrate of silver. The venous solution and tincture of opium, with various other stimulating and astringent applications, have been employed at this stage of the disease, but the solution just mentioned is far more beneficial than any of these. Its most convenient strength seems to be obtained by dissolving two grains in an ounce of rose-water, but many use it in a much larger proportion than this. Scarification of the inner surface of the eyelids was formerly much practiced in the chronic state of inflammation, but is now seldom resorted to, as the relief it affords is generally of short duration. It is executed by everting the eyelid to be operated on, scratching it longitudinally in several places with a lancet, and wiping away the blood as long as it flows, with a sponge or piece of lint. Leeches produce most effect when applied to the corners or angles of the eyes, particularly

the inner one. In obstinate cases of chronic inflammation, when no permanent source of irritation can be discovered to exist, advantage is frequently derived from effecting counter-irritation by blistering the back of the neck, or introducing a seton into it.

[Warm water as a lotion, or even the cold water dressing, is preferable to the blister, bloodletting, or seton. Equalize the circulation by bathing the feet daily in hot water, and use the alkaline bath to the injured surface.—R. S. N.]

CONSEQUENCES OF INFLAMMATION OF THE CONJUNCTIVA.

A purulent discharge from the surface of the inflamed membrane occasionally occurs, and constitutes what has been named Purulent Ophthalmia. The inflammation, though probably commencing in the conjunctiva, and chiefly observable in it, generally affects the other tissues of the eye, and it is apt to prove very destructive, when allowed to pursue its own course, by causing morbid adhesions, opacities, and ulceration of the organ. It most frequently occurs in infants soon after birth, and in young children. Many explanations have been offered to account for its origin in the former of these, such as the existence of gonorrheal or leucorrheal disease in the mother at the time of birth; but careful observation of all the circumstances concerned, leaves little doubt that the exciting causes are merely those which conduce to common inflammation, operating on a weakly or bad constitution. It is of great consequence to watch the eyes of children, and especially those of very tender age, lest inflammation should commence and proceed without being discovered until too late. The eyelids are apt to be glued together in the first instance, and though they afterwards become tumid, with distended veins, and of a livid hue, attention may still not be directed to the seat of the disease; and when at length the pent up matter gushes out, the organ is too frequently found irremediably injured.

If the patient is seen during the inflammatory stage that precedes the purulent discharge, which usually does not extend beyond a day or two, a leech ought to be applied at one or both of the angles of the eyes, according to the age and strength of the child. Warm fomentations, and a frequent separation of the edges of the eyelids are proper at the same time, due attention being bestowed on the secretions of the digestive organs. So long as symptoms of acute irritation continue, the same soothing system should be pursued; but when the disease begins to assume a chronic form, the solution of nitrate of silver ought to be employed; and in the still more advanced stage, if it prove obstinate, a succession of blisters applied to the back of the neck greatly contributes to arrest the morbid action.

A very violent purulent ophthalmia is occasionally met with in adults

who are affected with gonorrhea. There are two opinions in regard to its production; one being that it depends on a metastasis of the disease from the urethra to the eye; the other, that it proceeds from the irritation of matter casually introduced into the latter part. The former of these explanations seems very improbable; but whatever be the causes of the inflammation, there can be no doubt that it is extremely violent and destructive, in general resisting the most active treatment, and terminating in the serious imperfection or total destruction of the eye as an organ of vision. Free and repeated general bleeding, leeching, and warm fomentations should be used as early as possible; together with powerful cathartics and antimonial diaphoretics. If the disease assumes a chronic form, the treatment that has been already explained will be proper.

Ulceration of the cornea, or its conjunctival covering, is a very common consequence of inflammation. The ulcers are sometimes preceded by small superficial pustules, but more frequently appear without any such antecedent. They are usually small, round, and of a brownish color. They possess a very irritable surface, and consequently maintain the inflammatory symptoms. If large and deep, they leave, on cicatrizing, a permanent white spot named Leucoma. In treating them, the measures employed must be varied according to the acuteness of the inflammatory symptoms; but when these are of a chronic kind, as is usually the case, the solution of nitrate of silver always produces the best effects, and has now completely superseded a practice, formerly much in use, of touching the ulcers with a pointed stick of the lunar caustic. When the ulcers frequently recur, they will be found to depend on some indirect irritation, such as that caused by an unhealthy state of the digestive organs; and of course any such source of disturbance ought to be removed as soon as possible.

Opacity of the cornea varies in extent and depth. It always proceeds from organizable effusion into the natural texture of the part; but this may be induced in three ways: 1. Inflammation, leading to effusion in the superficial conjunctival covering of the cornea; 2. Effusion of lymph into the substance of the cornea with or without purulent matter; 3. Cicatrization of an ulcer. The first of these is named Nebula, the second Albugo, and the third Leucoma. Nebula is a very common consequence of conjunctival inflammation, especially in children. It occasions various degress of opacity, according to which, and also its situation in regard to the pupil, it interferes more or less with vision. The remedy consists in the introduction of stimulating applications, which promote absorption. Of these the solution of nitrate of silver is the most efficient. Albugo and leucoma hardly admit of removal. The treatment just mentioned sometimes produces diminution of the opacity, and is certainly preferable to the more severe

measures which have been proposed, such as excision or puncturing, since they not only do no good, but generally increase the evil.

Pterygium is a fleshy-looking growth of firm consistence, and flat triangular form. It is seated in the conjunctival covering of the sclerotic or cornea, always beginning in the former, and in its progress tending to encroach over the latter. It generally grows at the internal angle; the apex is always directed toward the pupil, and the transverse diameter of the eye passes through the center of its base. It occasions uneasiness, by obstructing the movement of the eyelids; and, if allowed to pursue its own course on the cornea, may ultimately impede vision, by covering the pupil. The local means which are proper for subduing chronic inflammation, sometimes check the progress of pterygium; but the radical remedy of it consists in removal. This is readily effected by seizing the growth with a hook or forceps, pulling it outward, and cutting it entirely away with scissors curved to one side. If it be so large as to lead to an apprehension of inconvenience from the contraction caused by the resulting cicatrix—a portion merely of the disease, about a line or two broad, and running transversely across it, may be removed. The vessels are thus completely interrupted, and the remainder of the excrescence gradually shrinks away.

A granular state of the conjunctiva lining the eyelids, is occasionally a consequence of chronic inflammation, particularly when it is associated with purulent discharge. The surface, instead of being soft and smooth, becomes covered with small elevated points or tubercles; and the irritation which is necessarily occasioned by the roughness thus produced, maintains the inflammatory symptoms, so that a reaction is instituted, which renders the ordinary treatment ineffectual. Sometimes, instead of this slight elevation and irregularity of the surface, the conjunctiva is extended into large fleshy-looking excrescences, which roll out upon the cheek when the eyelids are separated, and occasionally cannot be reduced without considerable difficulty. In the latter case, excision is the preferable practice; but, in the former condition, which is more frequently met with, though the knife and scissors have been employed, there can be no doubt that the best treatment consists in touching the granular surface from time to time, at the distance of a day or two, with lunar caustic.

Staphyloma is a projection of the cornea, of a round or conical form, and protruding more or less beyond the eyelids. It depends on expansion, together with thickening of the tissue concerned, which sometimes partially retains its translucency, but more frequently loses it entirely. The surface displays arborescent vessels, conveying red blood, and, in cases where the tumor is large, acquires a cuticular covering. The eye is rendered totally useless as an organ of vision; and the patient is apt to suffer occasionally from attacks of inflamma-

tion, which are induced by the exposed state of the organ to external irritation. The disease generally occurs as a consequence of inflammation of the purulent kind, but is sometimes brought on by violence. It almost always commences during infancy or childhood; and after attaining a certain extent, does not tend to increase. The treatment is either palliative or radical; the former consisting in the use of means calculated to allay the symptoms of temporary irritation; the latter in cutting away the whole of the projection from within a line of the sclerotic, which is easily done by pushing a sharp-pointed knife through it, and then cutting transversely so as to complete the division, first of one half, and then of the other, while the flap is held so as to steady the part under the knife. After this operation, the humors of the eyeball are more or less completely discharged, and the collapsed coats occasion no farther trouble, or may even be made the support of an artificial eye to conceal the defect. The best application during this process is a poultice, and if the inflammation runs too high, it must, of course, be controlled by appropriate measures.

INFLAMMATION OF THE SCLEROTIC.

The fibrous tissue of the eye is apt to inflame in persons who are subject to rheumatism, or who have had their constitutions impaired by the prejudicial influence of mercury, administered for the cure of venereal diseases. The attack is induced by the ordinary exciting causes of ophthalmia, especially exposure to cold. It is characterized by redness of the eyeball, attended with less swelling, and apparently more deeply seated than when the conjunctiva is the part affected. The distended vessels form a zone round the anterior part of the sclerotic about a line in breadth, and to the same extent distant from the cornea. Beyond this, the vessels in proceeding backward observe a radiating direction, and do not branch out as in the conjunctiva. In chronic cases, the eyeball, along with more or less of the redness that has been described, assumes a sickly yellow hue. The pain is of a dull aching kind, extending into the forehead, and generally suffering occasional exacerbations, with alternate remissions. The constitutional disturbance varies with the acuteness of the local symptoms. This inflammation may extend to other tissues of the eye, and produce destructive effects on them; but when confined to the sclerotic coat, it terminates always in resolution, or in a chronic state approaching to it. When acute, it requires bleeding, leeching, warm fomentations, and purgatives; and when chronic, cupping, followed by blistering on the back of the neck, with small doses of oxymuriate of mercury, Dover's powder, and colchicum, administered internally.

IRITIS, AND ITS CONSEQUENCES.

The Iris is liable to inflammation in consequence of local irritation, and also of indirect causes operating on an unsound constitution. The derangement of the system which seems most favorable to this effect, is that resulting from the abuse of mercury in the treatment of venereal diseases; but bad health, from original constitutional defect, or from an improper mode of life, may occasion a predisposition sufficient for its production, when the exciting circumstances are brought into action. It may also result from the extension of inflammation originating in some other texture, as the conjunctiva or sclerotic coat.

The symptoms are severe deep-seated pain of the eye, extending into the forehead, with more or less fever, according to the intensity of the local affection; the iris changes its color, usually acquiring a dull brick-red hue in part of its extent; the pupil is generally small, fixed, and irregular; the aqueous humor appears turbid; and there is a distinct red zone formed by the enlarged vessels of the sclerotic, at the distance of about a line from its connection with the cornea. The consequences of this inflammation, are effusion of lymph on either surface of the iris, which, becoming organized, may cause permanent obliteration of the pupil and adhesion of the iris to the capsule of the lens, or to the cornea. The lymph sometimes exudes in the form of distinct drops, which, when descending to the lower part of the anterior chamber, constitute what is called Hypopion.

In the treatment of iritis, the ordinary means of depletion, etc., are found to be insufficient for arresting the morbid process. The pain and fever may be thus diminished, but they are not removed; and the effusion of lymph proceeds as if no attempt had been made to control the disease. The grand remedy for it is mercury, given so as to affect the system, and if this be done early, while the usual measures for subduing inflammatory action are at the same time employed, and there is no local irritation present, there is almost a certainty of affording speedy and effectual relief. It is well ascertained that the constitutional action of mercury is the most powerful obstacle to the effusion taking place, and exerts the strongest influence in promoting the absorption of lymph which has been thrown out.* In the first instance, blood should be abstracted generally and locally, according to the violence of the symptoms; the bowels should be freely evacuated, and then two or three grains of calomel, with a quarter of a grain of opium, are to be given three times a day, until the mouth is affected, when the quantity of the medicine may be diminished so

* Dr. Farre and Mr. Travers. Cooper and Travers, Surg. Essays, Part i, p. 97.

as merely to keep up a moderate degree of ptyalism. In the second stage of the disease, much benefit is often derived from rubbing the forehead and neighborhood of the eye with a mixture of equal parts of mercurial ointment, opium, and the extract of belladonna. The disease sometimes occurs from the commencement in a chronic form, in which case, leeching and counter-irritation, by blistering on the back of the neck, ought to be conjoined with the mercury.

The permanent effects of iritis improperly treated or neglected, which consist in obliteration of the pupil, sometimes admit of remedy by an operation. The object of it is to make a new aperture in the iris sufficient for allowing the light required in vision to enter; and various methods have been contrived for its performance. The most important of these are: 1. Making a simple incision in the closed iris by means of a needle with cutting edges, or a small knife introduced through the sclerotic, at the distance of somewhat more than a line from the cornea, and carried forward through the membrane so as to effect its division to the extent required (Cheselden, Sir W. Adams); 2. Tearing away the iris from its ciliary attachment sufficiently for establishing an adequate opening, by means of a curved needle introduced through the sclerotic or cornea (Scarpa); 3. Dividing the iris from its center to the circumference in the direction of two radii meeting together at an angle of 45°, so as to form a triangular flap, the apex of which corresponds to the pupil, and its base to the ciliary attachment of the iris—a process that may be effected more easily than might be expected, by puncturing the cornea, and introducing the blades of very small curved scissors—one of which is sharp to penetrate the iris, and the other blunt to prevent injury of the cornea (Maunoir); 4. Cutting out a piece of the iris, which is done by puncturing the cornea and allowing the iris to protrude, or, if necessary, pulling it out with forceps, and then removing the portion thus presented by means of scissors curved on the side (Gibson). These methods have been variously modified and combined, and have led to the contrivance of an endless variety of instruments, the particular description of which will be found in the works devoted to ophthalmic surgery. The one last mentioned is easily performed; is not attended with much risk of the new aperture closing, and is little injurious to the other structures of the eye. The opening of the iris must be made opposite a clear part of the cornea, and the incision of the latter part should not, if possible, be directly over the new pupil, lest the opacity of its cicatrix should throw another obstacle in the way of vision.

[Iodate of potass., given in from one to two drachms a day, has accomplished in my hands all that is claimed for mercury in iritis. The irritating plaster may be used upon the back of the neck with

advantage in this case. Podophyllin and veratrin may also be used.—R. S. N.]

PROTRUSION OF THE IRIS.

When an opening is formed in the cornea, either by mechanical violence or ulceration, the iris is apt to protrude through it in the form of a round dark-colored tumor of variable size, which is extremely sensitive to external impressions, and consequently causes great irritation. If the protruded part be cut away, it is replaced by another portion; it should therefore be removed by caustic, which may be applied every other day. The nitrate of silver answers best for this purpose; and, by taking off the sensibility of the protruded surface, relieves the patient from pain before the tumor is destroyed.

DROPSY OF THE CHOROID COAT.

The Choroid membrane is liable to distension from the accumulation of a dark-colored fluid, which sometimes contains scales of cholesterine. The sclerotic and conjunctiva are protruded, and becoming thin in consequence of the pressure from within, allow the color of the fluid to appear through them. The use of the eye is sometimes retained, but frequently lost. If the swelling is small, it need not be interfered with—if large, it may be remedied by repeated punctures.

INFLAMMATION OF THE RETINA.

In some cases of inflammation of the eye, the Retina seems to be principally, if not solely affected. The patient complains of intense, deep-seated pain, accompanied with the false perception of sparks or flashes of fire, while the power of vision is greatly impaired, or altogether suspended. In some cases this defect proves permanent, but in others it disappears, together with the inflammatory symptoms. The most efficient treatment consists in copious depletion, both general and local, with active measures for promoting the intestinal secretions.

[Equalize the circulation and relax the system, and depletion is unnecessary.—R. S. N.]

CATARACT.

The lens and its capsule are liable, together or separately, to opacity, which more or less impedes vision, and constitutes the disease named Cataract. The substance of the lens, when thus affected, is sometimes firmer than usual, at other times softer, or even fluid, according to which varieties cataract is divided into hard, soft, and milky. Opacity of the capsule is seated in the anterior layer; when it exists alone, there is usually no lens, in consequence either of congenital defect, or removal by operation. Lenticular cataract, when solid, is generally of most firm consistence at the center. Its color is very various,

Fig. 138.

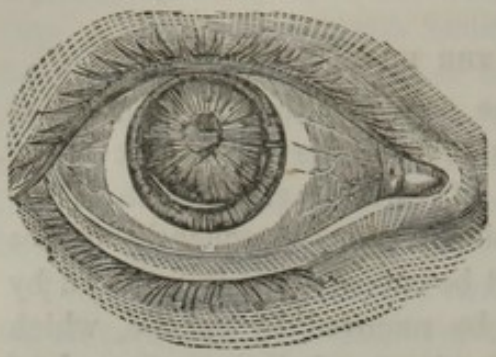
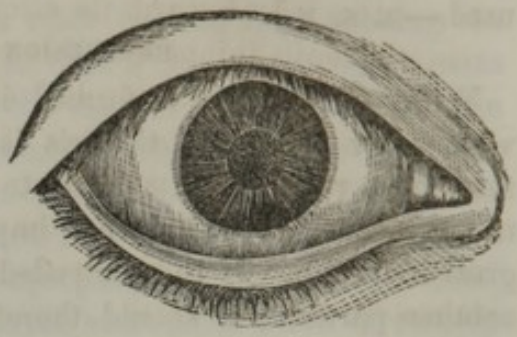


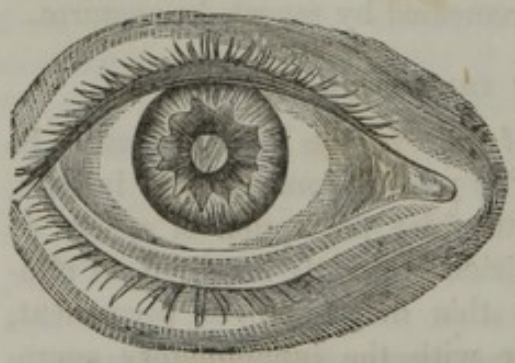
Fig. 139.



from dark-brown to white when examined through the cornea, but does not exhibit so much difference when removed from the eye, being for the most part grayish-yellow in the firm kind, and bluish-white in the soft or milky cataract. The last mentioned appears larger, and as if occupying the posterior chamber more fully than usual. Capsular cataract has a grayish mottled appearance, and seems as if flattened.

The causes of cataract are involved in great obscurity. It is sometimes congenital, and then consists either in opacity of the anterior part of the capsule, with atrophy of the lens, or in a soft curdy state of the latter. It frequently occurs at an advanced period of life, after the age of fifty, particularly in persons having light-colored eyes, where it is generally of dense structure. External violence, as that of a smart blow on the eye, or the penetration of a sharp pointed instrument into the lens, frequently induces almost immediately the formation of cataract, which, in such cases, is usually of a white color and soft consistence. It appears that the substance of a lenticular cataract suffers no change in its firmness during the continuance of the opacity, and that it is either hard or soft from the commencement of the disease.

Fig. 140.



The symptoms of cataract are: 1. A brown, yellow, gray, or white color of the pupil, instead of its usual blackness; 2. Defective vision, from mere dimness to complete blindness, except that the power remains of discerning the outlines of objects held between the eye and the light; 3. Mobility of the iris, and the absence of symptoms denoting affection of the nervous system.

As the opacity usually takes place slowly and gradually, the indications of it are at first very slight, and increase almost imperceptibly until it is completed. During the progress of the disease the patient

sees best in an obscure light, as the pupil then dilates most, and exposes the lens toward its circumference, where the opacity is less, partly from its thinness at this part, and also from the morbid change beginning at the center. Belladonna or other applications that dilate the pupil, improve the power of vision, on the same principle, so long as they continue in operation.

A great variety of means have been tried for arresting the progress of cataract, and inducing removal of the opacity by absorption, so as to restore the lens to its natural state. None of these have had the desired effect; and it is now admitted, that the only mode of relieving the patient is to remove the opaque body from the situation in which it impedes the entrance of light. The operations performed with this view may be divided into three kinds: 1. Those which merely alter the position of the lens, so as to prevent it from obstructing vision; 2. Those which extract the lens altogether from the eye; and, 3. Those which disintegrate the structure of the lens, and expose it to a process, whether of solution or absorption, is not well ascertained, but which gradually diminishes its fragments, and finally removes all trace of them.

The first of these methods, or Couching, as it is called, may be effected either by depression or reclination. In the former of these the lens is made to descend into the lower part of the eyeball, still preserving its original situation in regard to the parietes of the cavity. In the latter its upper edge is turned backward, so that the anterior surface is directed upward and the posterior one downward. Various instruments, named couching-needles, have been contrived for performing depression; but the most convenient is the one distinguished as

Fig. 141

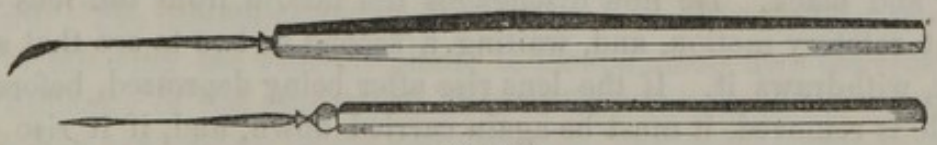


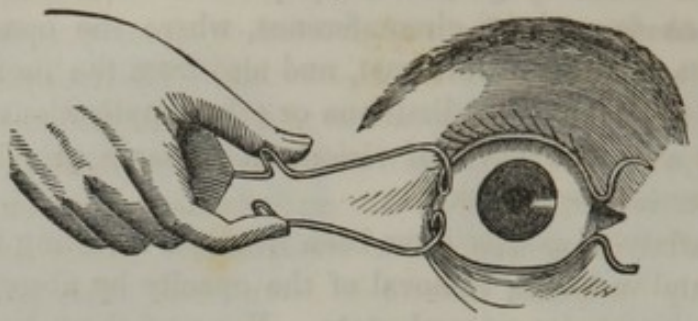
Fig. 142.

Scarpa's. It is an inch and a quarter long, and slightly curved toward the point, which is sharp.

[Fig. 142 represents Hey's needle, which I use in preference to Scarpa's.—R. S. N.]

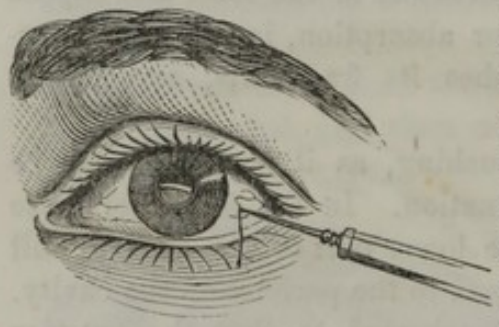
The pupil should be dilated by the extract of belladonna, rubbed over the forehead, or dropped in watery solution into the eye. The patient should be seated, or reclining in a posture perfectly horizontal. The upper eyelid must be elevated by an assistant, who, pressing on its edge with the points of his fore and middle fingers, or a levator, if the patient is a child, raises without everting it. The surgeon depresses the lower eyelid with his fore or middle finger, according to

Fig. 143.



the eye operated on, and places the other at the internal angle, so as to press on the white part of the ball, which powerfully counteracts the tendency it has to roll. [I prefer the eye speculum in this case.—R. S. N.] He then enters the point of the needle, the convex side of which is turned forward about a line and a half distant from the cornea, a little below the transverse diameter of the eye, pushing it suddenly through the coats. Pressing the handle towards the temple, he directs the instrument forward and inward, between the dilated iris and edge of the lens; moves it freely in the anterior chamber, so as to satisfy himself that it has pentrated the capsule; next places it across, so as to make its concavity correspond with a line a little above the transverse diameter of the lens, into the substance of which he fixes its point; and then, by a steady decided sweep of the hand, depresses the opake body into the lower part of the eyeball, so as to leave the pupil clear and black. He now disengages the needle from the lens by a slight rotatory motion, and, waiting a second or two to see that all is right, withdraws it. If the lens rise after being depressed, before the needle is removed, it must be again carried down, and, if it rise subsequently, the operation must be repeated, with an interval sufficiently long to prevent undue irritation. After the operation a piece of lint wet with cold water, should be applied, so as to cover the eye — the patient should be confined for three or four days to a dark room and to the antiphlogistic regimen, and the signs of inflammation should be carefully watched for, so that no time may be lost in using active depletion, and the other means that may be required.

Fig. 144.



The bad consequences of the operation are acute inflammation, caused by the derangement of structure which it occasions, and a chronic form of inflammatory action, which is not only extremely distressing to the patient, but apt to terminate in blindness, by rendering the retina unable to perform its functions, or leading to effusion of lymph

in the interior of the eye. The last two of these effects are usually ascribed to continued irritation proceeding from the displaced lens pressing on the ciliary processes and retina. The treatment that has been explained, in reference to acute and chronic inflammation, must be employed according to the circumstances of the case.

Reclination is performed in all respects as depression, except that the needle, after being applied to the anterior surface of the lens, is moved directly backward instead of downward. The advantage contended for in favor of this modification of couching, is the smaller risk of inducing chronic inflammation by the pressure of the dislocated lens, which, however, is more apt to rise again than when depressed.

Extraction of the cataract is an operation which was not practiced previous to the last century. It is effected by making an adequate opening in the cornea, puncturing the capsule, and thus allowing the

Fig. 145.

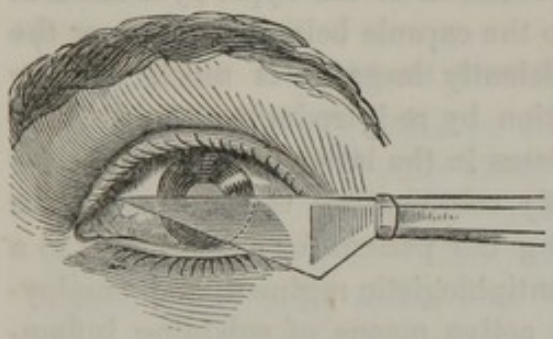
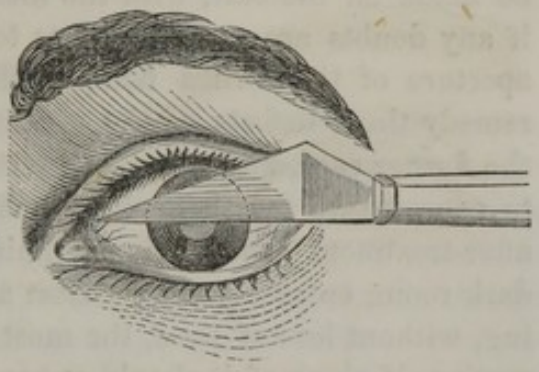


Fig. 146.



lens to escape. The advantages of this proceeding are: 1. That the lens does not remain to excite irritation; and, 2. That no part of the eye is necessarily injured except the cornea, which is not an irritable texture. The objections to it are: 1. The risk of wounding the iris, and of allowing the vitreous humor to escape along with the lens. 2. The difficulty of the operation; and, 3. The danger of the wound of the cornea not uniting by the first intention, and suppurating, in which case collapse, with opacity of the eye, are the necessary consequences.

The instruments required for the operation are a knife for cutting the cornea, and a small hook for rupturing the capsule. Richter's and Beer's knives are the best for the purpose. They should increase from the point backward in thickness as well as breadth, so as to prevent the aqueous humor from escaping until the incision is completed, or at all events carried so far that the cornea is transfixed, since the danger of injuring the iris is not so great after this has been done. The hook should be exceedingly small and rectangular, or instead of it, a curved needle may be employed. The pupil ought not to be dilated, lest the vitreous humor escape. The patient should be seated or reclining, with his other eye covered. The upper eyelid is to be carefully raised,

without making any pressure on the ball; and the operator then depresses the lower one, at the same time fixing the eye with his fore and middle fingers, as in couching. The point of the knife is entered about the distance of a line from the margin of the cornea, a little above its transverse diameter on the temporal side, and pushed steadily through until it issues at the opposite corresponding part. If the iris comes in the way of the blade, gentle pressure is made upon the cornea; and when the membrane has thus been induced to withdraw itself, the incision of the cornea is completed downward, at an equal distance throughout from the margin. The eyelids are then allowed to close, in order to dilate the pupil. The hook is cautiously introduced under the flap, and directed into the capsule, which should be freely ruptured. The eylids are again closed, and when they are opened a few seconds afterward, the lens may probably be found lying in the wound, or exterior to it. If it does not soon appear, very gentle pressure may be made on the ball, with the intervention of the upper eyelid. But if any doubts are entertained as to the capsule being ruptured, or the aperture of the cornea being sufficiently large, it is much safer to remedy these defects of the operation by re-introducing the hook in the former case, and a knife or scissors in the latter, than to endeavor to compensate for them by forcibly compressing the eyeball. The after-treatment consists in confining the patient for several days to a dark room, enforcing the strictest antiphlogistic regimen, and employing, without loss of time, the most active means of subduing inflammation, if signs of it should appear.

The operation of breaking up the texture of the lens may be performed either through the cornea (Ceratonyxis), or through the sclerotic (Scleroticonyxis). In the former way, a small straight needle is the best instrument, and in the latter, if the cataract is soft or fluid, the curved one used for couching, but if it is firm the edge should be straight and sharp. The pupil ought always to be fully dilated, and the eye, as well as the patient, prepared for the operation in the manner already explained in regard to couching. The needle should be introduced at the distance of a line from the sclerotic or cornea, according as it is wished to operate anteriorly or posteriorly. It should be directed to the center of the cataract, and made to lacerate its texture as extensively as possible. It has been found that the fragments disappear sooner in the anterior than in the posterior chambers, and therefore they ought to be urged forward into it. The process of amendment goes on a long while, extending to weeks and months after this operation, but one or more repetitions of it are frequently required before the cure is completed. As the irritation produced is generally very inconsiderable, this is of little consequence. If a large fragment of the lens, or the whole of it, escapes into the anterior

chamber, though solution may take place, there is great risk of such severe or continued irritation as may require its extraction through an opening cut into the cornea.

In relation to the choice of these different methods of operating, it may be observed: 1. That extraction and couching are confined to cases in which the cataract is of firm consistence; 2. That breaking up, though it has been applied to hard cataracts, is most advantageous in those that are soft or fluid; 3. That extraction is ill suited to cases in which the cornea is small or flat, or very prominent, the eye has a tendency to roll, and the patient is unsteady, as in infants or children, or the cornea is very tough and little disposed to unite by the first intention, as in old people; 4. That ceratonyxis, as being the easiest mode, is best calculated for infants and children; and 5. That the best procedure for general practice, is to introduce a curved needle through the sclerotic, depress the lens, if it is found to be firm, and break it up if the consistence proves too soft for this.

MALIGNANT DISEASES OF THE EYEBALL.

Cancer rarely originates in the eye, though it occasionally extends to it from the neighboring parts. But medullary sarcoma occurs in it more frequently than in any other part of the body, except the bones, mamma, and testicles. Children are chiefly subject to its attack, but adults occasionally suffer from it. The retina is generally the part first affected, but in the progress of the disease, all the textures entering into the formation of the eyeball become involved. The first symptoms are blindness, and a greenish or dusky-red color of the pupil. Then the eye protrudes, sometimes remaining entire, at other times ulcerating, and allowing a fungus to issue. The patient becomes weak and emaciated, loses his appetite, and acquires the greenish-yellow complexion characteristic of malignant action. The disease varies in the time required for its course from months to years, being usually most rapid in young, and slow in adult persons, but always terminates fatally.

The only remedy that affords any chance of relief, is excision of the eye before the morbid process has advanced so far as to render the removal of the whole tumor impracticable, and even then the prospect of a permanent cure is extremely unfavorable, since there is hardly any well-authenticated case of its being accomplished. Various methods have been contrived for performing the operation, but the best one seems to be, after dividing the commissure of the eyelids at the outer angle, in order to gain more room, to dissect out the tumor with a common scalpel, guiding it with the fore finger of the left hand, which being interposed between the morbid surface and the edge of the instrument, insures the complete excision of the diseased mass. The orbit should be filled, but not stuffed, with lint; and, if

the blood continues to flow, cloths wet with cold water may be applied over the face. When suppuration commences, the lint ought to be withdrawn, and replaced by a little simple dressing. The cavity granulates and contracts, but the cure is tedious, and too frequently, before cicatrization is far advanced, the morbid growth reappears.

[After the operation, I use the sulph. zinc to destroy any remaining disease.—R. S. N.]

TUMORS OF THE ORBIT.

Medullary or cartilaginous growths of the bones, polypous excrescences from the nose, and tumors of independent origin, are occasionally met with encroaching on the cavity of the orbit, and causing a correspondent protrusion of the eye. Vision is generally impaired or destroyed by the stretching of the optic nerve thus occasioned, but is regained when the eye returns to its place, unless the organ has participated in the morbid action. Before resolving on the removal of an orbital tumor, it is necessary that its nature and connections should be carefully investigated, in order that an attempt at excision may not be made unless the morbid part can be completely extirpated. Fatty, fibrous, and encysted tumors must be completely dissected out. Polypous excrescences ought to be treated according to the principles that will be explained in relation to the nose; and growths from the bone should not be interfered with unless they proceed from the malar or superior maxillary portion of the orbit, so that the root is within reach.

EYELIDS.

The eyelids are subjected to a chronic inflammation named *Ophthalmia Tarsi*, which chiefly affects their external edge at the roots of the cilia. The tarsal margin is swelled, red, and the seat of disagreeable itching. The eyelashes are small, or altogether absent. The eye is weak and watery. Children, especially those of scrofulous constitution, are most liable to this complaint, which generally proves extremely obstinate, in recurring again and again during the period of childhood up to puberty, though relieved for a time by the remedies that are employed to remove it. Stimulating ointments, such as those containing the red oxide of mercury, or the nitrate of mercury, are the best local applications, and should be rubbed along the margin of the inflamed eyelids at bedtime. Great attention ought to be bestowed on the maintenance, or restoration, of the various secretions, particularly those of the skin and intestinal canal, and counter-irritation by blistering the back of the neck, or introducing a seton into it, is often very serviceable.

The upper eyelid, and also, though much more rarely, the lower one, is liable to inversion of the margin, which is named Entropium. This occurrence is usually in the first instance caused by the swelling attend-

ant upon *ophthalmia tarsi*, and afterward tends to its own increase, as well as obstinacy, by the irritation which proceeds from the friction of the eyelashes upon the eyeball, and also from the tarsal cartilage acquiring a correspondent curvature, which opposes the return of the eyelid into its proper position. Tumors of the eyelid, and sometimes mere relaxation of it, lead to the disease. It occasions constant uneasiness, and in consequence of this, chronic inflammation of the conjunctiva, nebula, arborescent red vessels, and ultimately complete opacity of the cornea, are sooner or later produced.

The treatment is conducted with the view either of palliating or radically removing the disease. The former of these objects may be attained by pulling out the cilia from time to time, or applying straps of plaster, so as to maintain the eyelid in its proper place. As such means are very troublesome and ineffective, much attention has been bestowed on the radical cure, and various modes of procedure devised for its completion. The principle on which these are founded, is, to counteract the tendency to turn inward, by removing a portion of the integuments of the eyelid, so as to tighten or tuck up its external edge. This may be done either by cutting, or applying escharotics; but the former method is unquestionably preferable, since the latter, though recommended by some respectable authorities, is infinitely more painful, tedious, uncertain, and inefficient. The redundant skin is cut away with scissors much more conveniently than with a knife. The requisite portion should be embraced between the blades of a pair of dressing forceps, and removed at one stroke. It should in general extend from within a line of the edge of the eyelid, or roots of the cilia, to the same distance from the lowest hairs of the eyebrow, and reach the whole length of the eyelid, so that the form of the raw surface may appear nearly round when the eye is closed. Scissors of the usual form are quite sufficient for the purpose, but they prove more convenient when curved on the side. The cut edges must be brought into accurate contact by stitches of the interrupted suture, or small pins introduced at the distance of a quarter of an inch from each other. The wound heals by the first intention, and leaves hardly any vestige of its existence. In very aggravated cases it has been found necessary to divide the eyelids at their external commissure, in order to obtain sufficient relaxation for effecting the requisite eversion.

By Trichiasis is understood a morbid state, which produces nearly the same symptoms as entropium, but depends upon somewhat different circumstances. It seems to consist in an improper direction of the eyelashes, which, instead of defending the eye, turn inward upon it, so as to cause constant irritation. Attempts have been made to remedy this, by pulling out the cilia, cauterizing their roots, and cutting away their secreting bulbs, or even the whole edge of the eyelid; but all

these means are very ineffectual, and, at the best, afford only a temporary relief. The only method of curing the disease, is to treat it like entropium; and, by effecting a very decided eversion of the ciliary margin, prevent the eyelashes, though still possessing their improper direction, from touching the surface of the ball.

Ectropium is an opposite condition, chiefly affecting the lower eyelid. In this case the edge is turned outward, exposing the lining membrane to external irritation, presenting an unseemly appearance, and allowing the tears to run over the cheeks. The causes of this eversion are thickening, or excrescence of the inner surface, relaxation of the orbicular muscle, and the contraction occasioned by the healing of sores in the integuments. The treatment must of course be varied according to these different circumstances. If the disease depends merely upon a thickened state of the mucous lining of the eyelid, touching it occasionally with nitrate of silver, or concentrated sulphuric acid, or shaving away a portion at once with curved scissors, are the means usually employed. If the eyelid is preternaturally relaxed, a V shaped piece may be cut out of it, and the edges then united together by one or two pins; and, if the edge is drawn outward by a cicatrix of the integuments, the contraction should, if possible, be cut out, so that the lips of the wound may be united together directly.

Encanthis is a tumor which sometimes presents itself at the inner angle of the eyelids. It has a fleshy consistence, and tubercular surface. The color is generally pale red, but sometimes very dark, and almost black. It grows from the *caruncula lacrymalis*, and by its pressure not only causes a disagreeable deformity, but impedes vision, and also the motion of the eyelids. The remedy consists in excision, which may be performed either with a knife or scissors, care being taken to streteh the attachments of the tumor, by pulling it out with a hook or forceps, so as to prevent any chance of cutting the lacrymal ducts, which lead from the puncta to the sac.

Encysted tumors are often met with in the eyelids, particularly the upper one. They are sometimes seated immediately under the skin, and may be removed by dividing it to the requisite extent, and then dissecting out the cyst. Much more frequently they lie deeper, and adhere to the mucous lining of the eyelid, which is discovered by their immobility, and the appearance presented by the inner surface of the eyelid when it is brought into view by being everted. The part with which the tumor is connected has a yellowish color, streaked with red, from the arborescence of vessels over it, and seems flatter than the neighboring surface. In this case the extirpation could not be accomplished by cutting externally without making a breach through the eyelid, and the proper method is, to remove an elliptical portion of the sac from within, squeeze out its contents, and then apply

the nitrate of silver so as to hasten healthy granulation of the cavity. The best way of doing this is to evert the eyelid, transfix the sac with a hook, and then cut out a portion of it with a sharp-pointed knife.

Cancerous ulceration sometimes affects the eyelids; and, as excision of course affords the only effectual mode of remedy, it is important to determine how far these coverings of the eye may be removed without incurring the necessity of removing the eye itself. It appears that the whole of the lower lid may be taken away without almost any inconvenience, and that a large part of the upper one may also be extirpated without depriving the eye of its necessary protection from external irritation. But if the whole of the upper eyelid required removal, it would be necessary to take away the eye along with it, as the patient could not otherwise avoid suffering extreme distress from the exposure of the organ until it acquired a cuticular covering, which, while it afforded protection against irritation, would effectually destroy the power of vision. It will seldom be necessary, however, to cut out a sound eye on this account, as when the cancer is so extensive as to require removal of the whole or greater part of the upper lid, it almost always extends to the conjunctival covering of the ball.

[In conformity with the strict meaning of the above name, I shall confine my remarks on the organ so far only as concerns vision, and yet it is more frequently employed to express inflammation of the conjunctiva. It has been, furthermore, divided into many varieties under names which are so arbitrary as to be, in many instances, more expressive in different stages and constitutional modifications of the same form, than of distinct varieties. But as it is probable that a more scientific arrangement would scarcely compensate for a departure from the one usually adopted, and with which the profession is generally acquainted, I shall pursue it.

MILD OR CATARRHAL OPHTHALMIA.

The conjunctiva, the membrane in which this disease is located, should not, perhaps, be regarded as purely mucous, but as partaking of the nature of the cutis, and also of a mucous structure, and therefore subject to those changes which inflammation is known to produce in both of them; such as increased vascularity, swelling, and altered secretion. In mild cases, these changes are not very remarkable—the conjunctiva merely becoming red and more or less tumefied, and terminating by resolution. But in other instances, as in purulent ophthalmia, it runs into a most destructive process.

Catarrhal ophthalmia is the mildest form of the disease and of much more frequent occurrence than any other. It becomes introduced to the notice of the patient by pain, intolerance of light, and a sensation that cannot be compared with anything else than the presence of sand,

or an inverted eyelash between the palpebræ and the globe of the eye. But it should be remembered that this sensation is common to all the varieties of conjunctivitis, and is considered by some to be diagnostic of it; and as it is occasioned by the turgescence of the vessels of the conjunctiva, the opinion is doubtless correct. The patient has no other idea than sand or some other foreign matter in causing the irritation for which he rubs his eyes, and thereby aggravates the disease. Succeeding to this sensation is one of heat, as though the part had been scalded.

The inflammation, in this variety, usually terminates by resolution, but sometimes a purulent discharge is observed, which is by no means copious—seldom so violent as to occasion chemosis or sloughing of the cornea.

In adults, it is most frequently produced by cold and damp air; but it is sometimes occasioned by an intemperate exposure of the eyes to a strong light, long-waking by candle-light, intemperance in the use of ardent spirits, and occasionally by gastric and intestinal irritation. Finally the liability of this membrane to inflammation is that which is common to other mucous surfaces, and from similar causes.

It is endemic, and appears sometimes to be epidemic, but it is not known to be contagious—and yet it frequently runs through a family, and not unfrequently so invades a school, that but few of the pupils escape it. At one time, while a boy at school, it appeared as an epidemic—so much so that not a single child escaped an attack, and several lost almost the entire use of one eye. It may be remarked, that young subjects are more liable to it than adults.

As it is possible for the inexperienced to confound catarrhal ophthalmia with the rheumatic or sclerotitis, it becomes proper to indicate the difference. In conjunctivitis the vessels are tortuous, and the color a scarlet red; in sclerotitis the vessels are finer or hair-like, straight and radiated, and the color, which is seen through the conjunctiva, is of a pink, or possibly of a violet hue. The pain of catarrhal ophthalmia is slight, and the intolerance of light is but little, while in the rheumatic the pain is severe, dull, and aching, throbbing, and felt with as much severity, if not with more, in the surrounding parts than in the eye—there is, furthermore, great intolerance to light. Frequently through the day the pain is not much, but as night approaches it increases and continues to do so until after midnight. When attention is given to these diagnostic differences, a mistake cannot be made.

Unless the constitution be depraved, or be broken down by unnecessary active medication, there is no serious danger to be apprehended from catarrhal ophthalmia.

In catarrhal ophthalmia, the feet should be bathed in hot water for

some fifteen or twenty minutes; after which sinapisms should be applied to them, and if the inflammation be severe, likewise to the back of the neck. The bowels should be kept in a laxative condition, and the patient placed upon non-stimulating diet.

Local applications should be made over the eyes of warm fomentations of elm bark and hops, and the eyes should be frequently bathed with an infusion of hydrastis, or the following preparation:

℞. Tinct. aconite, 3ss;
Tinct. gelseminum, 3j;
Hydrastin grs., xx;
Aqua, f3ij. Mix.

In some instances, the application of cold water over the eye, on cloths, changed every few minutes, has been very useful. If much pain, watchfulness, or nervous irritability be present, the compound powder of ipecac. and opium may be given. The tincture of gelseminum may also be relied upon, given internally, in this disease, in doses of from fifteen to twenty drops, four or five times a day, to an adult, and in proportion to children; but as this usually occurs in the latter, the treatment must be made accordingly. The gelseminum, in half-grain doses for an adult, given four times a day, is preferable, in some cases, to the tincture, for in this form its effect upon the system is more permanent and lasting.

When the more active symptoms have subsided, in many cases a more stimulating application will be found necessary, for the purpose of increasing the activity of the absorbent vessels, for which I prefer the above combination, with the addition of half a drachm of tinct. capsicum. In some cases the compound collyrium of goldenseal, the compound myrrh collyrium, or the compound soda collyrium, of the Eclectic Dispensatory, may be used with advantage.

The patient, both during the disease and for some time after convalescence, should avoid exposures, as well as excesses in eating, drinking, exercise, etc.

SEVERE OR PURULENT OPHTHALMIA.

This variety of ophthalmia is sometimes called Egyptian, and sometimes contagious ophthalmia. It differs from the preceding mainly in being more severe, and in being occasioned by different causes. Gonorrheal ophthalmia and the purulent ophthalmia of infants are regarded as varieties of it. The only notable difference, of consequence, between purulent and gonorrheal ophthalmia, consists in the difference between their respective causes. It is stated, however, that the gonorrheal frequently attacks but one eye, while the purulent most generally invades both.

As Dr. Vitch (En. Prac. Med.) has had more favorable opportunities for obtaining an accurate acquaintance with this form of ophthalmia, I cannot do better than to give his description of it. He says:

"The first appearance of inflammation, after the application of the virus, is observed in the lining of the lower eyelid. It assumes first a mottled appearance, and then a fleshy redness. A little mucus is generally present at the doubling of the conjunctiva at its lower part. The disease, I know from observation, may remain in this state for twelve hours before it invades the conjunctiva covering the eye; sometimes it may be longer, and in some cases, where the contact of the virus has been slight, or removed by immediate washing, the disease never went farther than producing the redness of the lining of the palpebra. In sclerotic inflammation, the lining of the eyelids preserves, in some degree, its natural whiteness, especially just under the tarsi, for days and weeks. The progress of the inflammation, when it extends from the conjunctiva of the eyelids to that covering the globe of the eye, is often so rapid as to elude any distinct observation; but frequently it advances more gradually, preserving a defined line, until it extends over the whole membrane as far as the cornea. No part can be said to be more vascular than another, as the whole seems equally injected, and no space unoccupied. The disease is often thus far advanced before the attention of the patient is so much excited as to make him complain, a certain degree of stiffness being sometimes the only sensation which accompanies it.

"The first and chief uneasiness in this stage of the disease is described as arising from the feeling of sand or dirt rolling in the eye. This sensation is not constant, as it comes on suddenly, and as suddenly departs, confirming to the patient the idea of something extraneous being lodged in the eye. I have always observed that its attacks are in the evening, about the time of going to bed, or very early in the morning. Their duration varies; sometimes an attack abates in an hour, and sometimes continues during the whole night—those coming on in the evening being always the most severe. This symptom requires particular attention, as its accession is a certain index of the disease being on the increase."

So violent is this disease, that a yellow, thick pus is soon made to issue from between the greatly tumefied lids, and it is frequently so acrid that it excoriates the cheeks as it flows over them. It is common, too, for the matter to become effused between the conjunctiva and the sclerotic, causing the former to become elevated around the cornea, giving the idea of a ring—the cornea thus appears at the bottom of a pit, and so deeply is it invested in this wise, in some instances, as scarcely to be seen. For the clear understanding of this phenomenon,

it is proper to remark that the union between the conjunctiva and the cornea is too close and intimate to admit an effusion of pus between them, which is not the case between the former and the sclerotic.

Effusion of matter also, in many instances, is effected in the sub-conjunctival tissue, producing tumefaction of a fleshy-red color, which is frequently attended with patches of extravasated blood. It is also worthy of remark, that this matter not unfrequently becomes effused into the cellular tissue which unites the conjunctiva to the palpebra, thereby causing such extensive swelling as to conceal entirely from our view the globe of the eye. But it is proper to add, that so long as the disease is confined to the conjunctival lining of the eyelids, no very serious consequences need to be apprehended, yet it has a tendency to extend itself to the cornea, and occasion in it ulceration and sloughing—a rupture of the cornea, an escape of the aqueous humor, a protrusion of the iris, and finally a total loss of vision.

As an illustration of its mischievous character, I may cite a statement of Dr. Watson, viz: in the "military hospitals at Chelsea and Kilmainham, there were, December 1, 1810, no fewer than two thousand three hundred and seventeen soldiers a burden upon the public from blindness in consequence of (purulent or Egyptian) ophthalmia."

The question is still debated as to whether it is or not contagious. From an investigation of the argument, I have concluded that the affirmative is the more ably maintained. At all events, when we have it to contend with, prudence would dictate that we should act as though the affirmative was established.

That purulent ophthalmia, under some peculiarities of constitution, may be produced by the same causes that produce the catarrhal, or by such as produce violent inflammation of other mucous membranes, may, I think, be admitted—namely, currents of cold air, the introduction of acrid, or indeed of almost any foreign matter, sudden transitions of heat and cold, and finally, those atmospheric conditions which produce other forms of inflammatory disease. From this last cause we may even suppose the disease to become epidemic.

We are not yet able to determine why it is that one season produces dysentery and another continued fever, nor can we be sure that some modification of such an atmosphere might not produce purulent ophthalmia. Those who deny its contagious nature contend that it is an atmospheric disease. Assalina says (Watson's Prac.): "The atmospheric conditions which are known to occasion catarrhal affections are very frequent and powerful in Egypt; the days are very hot, the nights chilly and attended with heavy dews; and men's eyes are perpetually exposed in the day time to a dazzling glare of light from the white and arid surface, while the air is full of floating particles of hot sand which are raised from the ground by the slightest breeze."

We may admit all this, and still contend for the contagious nature of the disease. Whatever the abstract fact may be, it is now well known that the matter of purulent ophthalmia will produce the same disease when introduced into the eye of a well person, and that when the disease invades a ship, a school, or an army, a large proportion of the individuals composing the crowd, respectively, will be affected, as we stated in treating of the previous form of the disease.

After a few remarks upon the subject of gonorrheal ophthalmia, I close what I have to say about purulent ophthalmia. As its nature imports, this modification of ophthalmia results from gonorrhea—most frequently, if not always, by direct inoculation or introduction of gonorrheal matter from the urethra. It has been contended that it may result from a metastasis of the urethral inflammation to the eye; it is also supposed that purulent ophthalmia may result from gonorrhea, just as sore throat may result from syphilis. While I admit the two latter, as causes of purulent ophthalmia, as being perhaps possible, I confess that I have very little faith in the probability; and further state that I have never seen a single case in my own practice, in proof of this opinion.

In all casual or isolated cases of purulent ophthalmia, we should endeavor to ascertain whether it be not of gonorrheal origin. This information may not avail us anything in the treatment, but, beside affording some satisfaction, it might induce us, under some circumstances, to establish prudential measures with reference to those who may be associated with the patient.

If the disease be confined to one eye, we may, in the proportion of one to a hundred or so, suspect it to be gonorrheal. Contagious ophthalmia, according to Dr. Vitch, will occur in one eye one time in a thousand cases, and, according to Mr. Lawrence, gonorrheal ophthalmia will invade both eyes once in every seven cases and a fraction.

As there is no other disease with which purulent ophthalmia can be confounded, and as the prognosis can be inferred from what I have said, I pass to the treatment.

In newly-born infants, this disease will generally yield to local infusions of hydrastis, or hydrastis and witch-hazel leaves, or the tincture gelseminum may be applied several times a day.

In the early stage of purulent ophthalmia, should inflammatory symptoms be present they must be treated in the same manner as named for the early stage of the catarrhal form. After which the treatment must consist of constitutional as well as local remedies. The local remedies may be the same as referred to in the latter stages of catarrhal ophthalmia; or the eyes may be frequently bathed with infusions of hydrastis and geranium, hydrastis and althæ officinalis. The compound syrup of stillingia with the iodide of potassium, or the

stillingin, phytolacin, and irisin, are undoubtedly the best constitutional remedies that can be given; and if the disease proves very obstinate, an irritating plaster may be applied to the nape of the neck, extending round and up behind the ears. It must be borne in mind, that if the stimulating applications irritate the eyes, rendering them worse, they must be omitted for a time, and more soothing measures employed.

In the treatment of gonorrheal ophthalmia I employ the above constitutional treatment, with local application to the eye of nitrate of silver, a solution of the sesquicarbonate of potassa, mild zinc ointment, hydrastin ointment, etc.

IRITIS—RHEUMATIC OPHTHALMIA.

This portion of the eye is frequently the subject of inflammation, independently of any other structure; but the choroid, retina, and sclerotic are frequently involved with it. The iris is stretched across the anterior chamber of the eye, which is lined by a closed sac, having all the peculiarities of a serous membrane, in both health and disease, and under the influence of inflammation, it is liable to form adhesions which may change the size and shape of the pupil, and the movements of the iris; it is also liable to throw out coagulable lymph, which may entirely close the pupil.

The presence of this disease is announced to the patient by some intolerance of light impairment of vision, and circumorbital pain; and to the physician, by a vascular redness around the cornea, in the sclerotic, which consists of fine, straight lines that converge toward, and stop abruptly at or nearly at, the cornea, and appear to penetrate and pass through the sclerotic, to attain the iris. In severe cases, the conjunctiva may be more or less involved, and when it is, then its red and vascular peculiarities are blended with those of iritis. The color of the iris will depend, in a great measure, upon the color it had in health. Blue or gray eyes become yellowish or greenish, and dark-colored eyes are changed into a tinge of red. This change is effected by an admixture of the lymph with the original color of the iris.

During the existence of this inflammation, there is not only circumorbital pain, but pain in the globe of the eye, and also in the temple, and it is generally more severe at night. This pain and the attendant fever are quite variable, and in many instances not proportioned to the mischief that is going on. In some cases the pain is severe and unceasing; while in others, but little is complained of. These remarks are true of the attending fever. When the disease is acute, it is common for the febrile manifestations to be very considerable—such as white tongue, full and hard pulse, pain in the head, and broken rest.

The effusion of lymph very frequently becomes visible upon the surface of the iris, but its character varies much in different cases. In some cases, it appears in little spots or specs of a rusty color; in others, in a thin sheet or layer of the same color, and in others, in the form of tubercles, some of which may be as large as a squirrel shot. In severe or neglected cases, suppuration takes place, the pus is discharged into the anterior chamber, and in sinking to the bottom of it, presents that appearance which has been called *hypopyon*.

Whatever may be the grade of the inflammation, vision is always impaired by it, in consequence of the injury inflicted upon the iris, the tunics posterior to the eye, and most obviously to the cornea, which is rendered more or less opaque.

In arthritic and rheumatic organizations, this disease may occur from causes similar to those which produce gout and rheumatism, respectively. Those causes which produce ophthalmia in general, are said to produce iritis; but we are disposed to believe that they will do so only in the constitutions above named. It is said to occur in secondary syphilis, and is then called syphilitic ophthalmia, or iritis. It is also maintained by some to result from the use of mercury—which I regard as probable—but in both instances, I am disposed to confine it to the organizations before named. It is also said to originate in a scrofulous disposition, and hence authors treat of strumous ophthalmia, meaning iritis. About this I am skeptical—there is too much difference between the rheumatic and the strumous organizations for both to be liable to the same form of disease.

That form of disease known as strumous ophthalmia of children, is treated of as being confined to strumous constitutions, but this the writer *knows* to be an error. He has seen one well-marked case in a boy, in whose family nothing of a scrofulous tendency was ever known—and now, as a man, he is very muscular and of a decidedly rheumatic organization. He admits, also, that the so-called strumous ophthalmia is associated with some depravity of the constitution, but it does not follow that it must be a strumous one.

Inflammation of the other structures of the eye do not often occur independently of conjunctivitis and iritis, and as the treatment of these two forms will necessarily embrace the others, a special description becomes useless, more especially, as much yet remains to be learned about them, as independent forms of inflammation.

In the treatment of iritis, the bowels must be purged, the purge being followed by a spirit vapor-bath; the perspiration must be kept up for several hours by nauseants and diaphoretics; sinapisms must be applied to the feet and nape of the neck. Cold water may be applied constantly to the eyes, on cloths, which should be changed every few minutes. Sometimes cold applications increase the pain;

under such circumstances, warm water may be substituted, or fomentations of hops, or stramonium leaves. This treatment should be energetically pursued and persevered in. The bowels should be kept regular during the treatment.

If the disease should run into the chronic form, stimulating applications must be made to the eye, the same as mentioned in the previous ophthalmic affections, and the above treatment continued. In debilitated patients, tonics must be administered, as iron, hydrastin, cornin, compound wine of comfrey, etc., and in very obstinate cases an irritating plaster may be applied, as in the previous forms, with advantage; and this should be continued as long as there is any soreness or sensitiveness to the light.

It is thought by some that nothing but depletion and salivation can arrest this disease. I know this is not the case, yet the most active alterative and relaxant course is the one to be pursued; hence the use of the gelsemin, iodide potassium, irisin, phytolacin, stillingin; and as there is so much periodicity attending the disease, the quinine, iron and gelsemin may be used actively.

When the pain is so severe as to require the use of anodynes, I have found the lupulin, in from three to six grain doses, repeated as often as required, of value, also the hyoscyamin, in from one-fourth to one-half grain doses, to answer better than the opium preparations. These agents, in their concentrated forms, are new, yet they are worthy of confidence.

In the active form, the diet should be light; in the chronic, nutritious, digestible, avoiding fats, acids, and the use of alcoholic liquors.

I use the mild zinc ointment, the hydrastin ointment, the collyrium of hydrastin and aconite, in a great variety of diseases of the eye. In many cases I use the eye-cup with advantage. The gelsemin and veratrin I use much in ophthalmic diseases. The tincts. of the above may be used as local applications in the proportion of one drachm to four or six ounces of water.—R. S. N.]

OBSTRUCTION, ABSCESS, AND FISTULA OF THE LACRYMAL PASSAGE.

The duct which discharges the tears into the nose is apt to become obstructed at its inferior orifice, so as to impede or altogether prevent the fluid from descending. This usually occurs in persons who have been previously suffering from chronic inflammation of the conjunctiva or *ophthalmia tarsi*, and it has consequently been ascribed to the accumulation of thick mucous matters resulting from the morbid secretion thus produced. It seems more reasonable to suppose, that by an extension of diseased action, the lining membrane of the nasal duct swells so as to contract or close the canal. The distinctive symptom of obstruction is distension of the lacrymal sac, forming a flattened

round tumor at the inner angle of the eye, lying under the tarsal ligament, and hence often appearing as if bilobated. It is immovable, and when subjected to pressure, usually diminishes or disappears, the contents being forced either downward through the duct, which remains pervious though contracted, or upward through the *puncta lacrymalia*. When the secretion of the tears is excited by mental emotion, or external irritation, such as that caused by a cold wind blowing on the eye, they run over the cheeks more copiously than in ordinary circumstances, and the patient frequently complains of a disagreeable feeling of dryness in the nostril.

The treatment of Epiphora, as this morbid condition of the lacrymal passage has been named, is conducted on different principles, according to the view that is entertained of its origin and cause. There can be no doubt that a diseased state of the eyelids, whether regarded as leading directly or indirectly to the obstruction, ought to be remedied if possible, without delay. It is then customary to inject fluids into the puncta, and introduce small gold or silver probes through them in order to clear the passage; but such means are found to be very ineffectual. The probe should be round, and very smooth at its extremity, to prevent its being caught in the lining of the canal, and slightly curved to suit the direction of it. Either the upper or lower punctum may be selected; but unless they happen to be unusually expanded, it will be proper, before attempting the introduction of the probe, to dilate the orifice by means of a common pin, the conical point of which, when rotated, answers very conveniently for the purpose. The probe should first be passed directly inward, and either upward or downward, accordingly as the lower or upper opening is chosen, until it fairly enters the sac. The direction must then be altered, so as to be parallel with the mesial plane, the convexity of the instrument resting on the eyebrow, and the extremity pointing downward and backward. By gently, but steadily, urging the instrument, alternately pushing or withdrawing a little, it is at length introduced into the nose. By repeating this operation, and using probes of larger size in succession, some relief may be afforded, but hardly any complete or permanent benefit. The introduction of probes from the nose into the duct, though very easy in the dead body, is hardly practicable in the living, especially when the entrance to the passage is obstructed. Injections thrown in through the puncta, by means of Anel's syringe, are of so little avail that they need not be particularly considered.

If the disease proves so obstinate and troublesome as to make the patient willing to suffer the pain and inconvenience attending the following operation, it ought to be performed. The object is to remove the obstruction, and prevent its reproduction. With this view an

incision is made into the lacrymal sac, by pushing a sharp pointed knife into it, immediately below the ligament that extends from the inner commissure of the eyelids to the nasal process of the maxillary bone. The most convenient instrument for this purpose is here represented. After the point has been fairly introduced into the sac, by pushing it backward and inward, the handle must be raised so as to alter the direction of the blade, and push it downward into the duct. A thick probe should then be passed through the opening, down the duct into the nose. The obstruction having thus been removed, a piece of bougie, or a small metallic instrument named a style is introduced. The style may be made of silver, lead, or any other metal not readily oxydized; it is suited to the form of the passage, and has a broad head to prevent it from descending too far. It should be taken out daily, washed, and replaced. So long as it is worn, the patient is relieved from the inconvenience he formerly suffered, but when it is withdrawn, the passage is apt to close again. Trials may be made from time to time, at the interval of six or eight weeks, to ascertain whether or no the foreign body can be dispensed with. Some practitioners, to supersede the necessity of this tedious and imperfect process, immediately after removing the obstruction, introduce a small silver tube, which is allowed to remain permanently, so as to insure the canal against closure in future. The objection to this practice is the risk of exciting irritation, which appears so serious as to deter most surgeons in this country from employing it; but the statements of some continental practitioners would make it appear that this apprehension has been allowed to exercise an undue influence.

Fig. 147.



When the obstruction is permitted to continue, it sooner or later occasions suppuration of the sac, and the abscess thus formed being opened naturally or artificially, allows the tears to issue on the cheek, in which case there is produced what may be more strictly named a *Fistula Lacrymalis*. The neighboring integuments become thick and red; the eye is weakened; and the patient suffers so much from the deformity and inconvenience resulting from the disease, that he readily submits to the operation required for his relief. This does not differ from the one that has been described for epiphora. It was formerly the custom to apply the actual cautery, though a canula introduced into the entrance of the duct, in order to destroy the diseased parts which were thought to oppose recovery; but this practice is now obsolete.

CHAPTER XXV.

MOUTH.

SALIVARY GLANDS.

The ducts both of the parotid and submaxillary glands are liable to become the seat of calcareous concretions, which are named Salivary Calculi. Their composition is phosphate of lime, agglutinated by a small quantity of animal matter. They have usually a yellowish-white color, oval figure, and finely tuberculated surface. They vary in size from that of a millet-seed, to that of an almond with the shell. In the parotid duct, they are very rarely met with, but in the submaxillary one not unfrequently. They occasion pain, swelling, and hardness, and sometimes impede the flow of the saliva, or give rise to the formation of an abscess. In the parotid duct, the symptoms thus produced are apt to be confounded with those of rheumatism, toothache, gum-boil, or suppuration of the maxillary antrum; while under the tongue they may be occasionally mistaken for those of encysted tumors. In all cases of doubt, it is right to search the duct with a probe, and to feel for the calculus, by pressing on the place where it is suspected to be. So soon as a free incision is made, the concretion escapes, together with the fluid accumulated about it. The usual situation of these concretions is immediately within the orifice of the ducts; but they have also been found imbedded in the substance of the submaxillary gland, where they excited an increased and unhealthy secretion, with general swelling and hardness of the gland. In such cases the calculus, if distinctly recognized, may be extracted by cutting down upon it, from the mouth, which I have had occasion to do.

When the parotid duct is included in the wound of the cheek, unless the edges of the integuments be very closely approximated, a salivary fistula is apt to remain at the part. In case it should take place, the patient will labor under the double annoyance of dryness of the mouth during mastication, and a discharge of fluid on such occasions from the preternatural orifice. The use of soft or fluid food, and pressure applied to the gland, afford some palliation of these complaints; but the radical cure of them requires the re-establishment of a passage into the mouth, and obliteration of the external aperture. Both of these objects may be readily obtained by introducing a small seton through the cheek, from the fistula into the mouth, withdrawing it after the lapse of a few days; and then, having rendered the edges

of the external opening raw by paring them with a knife, uniting them together by means of the twisted suture. Until the cure is completed, the patient should subsist on fluid articles of nourishment, and abstain from moving the jaws by speaking, or any other exercise of them.

The neighborhood of the parotid gland is frequently affected with diffused inflammation and suppuration of the cellular substance, which, owing to the presence of a thin but dense fascia lying over this part of the face, does not form a prominent tumor, and spreads extensively instead of pointing. The patient in consequence suffers great and protracted distress, until an incision is made to let the matter escape.

Morbid growths also often occur here, and by causing absorption of the parotid in proportion to their own enlargement, at length sometimes completely take the place of the gland. These tumors are generally of the fibro-cartilaginous kind, usually containing cysts in their substance, and tending at length to assume the medullary sarcomatous action. Blistering and iodine ointment occasionally check the increase, or even excite the removal by absorption of enlargements in this situation; but when they prove obstinate, the only remedy for them is the knife. If the morbid mass is deeply seated, it may be necessary, in effecting its excision, to cut not only the common trunk of the temporal and internal maxillary arteries, but also the *portio dura*, or facial nerve, the consequence of which is an unseemly and distressing paralysis of the face. In such circumstances, therefore, unless the progress of the growth is rapid, or there should be reason to dread its speedily assuming malignant action, it will be advisable to abstain from any operation. When it is thought proper to remove the tumor, a free crucial or elliptical incision of the integuments should be made, according to its size and shape, so as to facilitate the subsequent dissection. After the whole of the external surface of the tumor has been exposed, its anterior edge should be elevated, and turned back by degrees, as the subjacent connections are divided, which ought to be done by cutting upon the tumor so as to divide the connecting cellular substance, without endangering the neighboring parts by carrying the knife parallel to the surface of the tumor. The arteries that require ligatures are to be tied, and if, as sometimes happens, a troublesome oozing of blood takes place from the glandular substance of the parotid, a piece of lint or sponge may be placed in the wound until it ceases.

Tumors are occasionally met with under the tongue varying in size, and producing accordingly more or less inconvenience. Of these the most common is named Ranula. It consists of a sac containing fluid, which is usually thick and glairy, like the white of eggs, but sometimes is watery, or of a pultaceous consistence, like that of porridge or boiled rice. Hardly any limits can be assigned to the extent of such

formations, if allowed to increase without interference. The tongue is impeded in its movements—articulation and deglutition are rendered very difficult—the cavity of the mouth is completely occupied by the tumor—and it also appears under the chin. This swelling is generally attributed to distension of the submaxillary duct, owing to obstruction of its orifice, but really depends on the presence of an encysted tumor. The treatment it requires is excision of an oval piece of the cyst, together with the superjacent mucous membrane, which may be easily effected by means of a hook and knife or pair of curved scissors. The cavity suppurates and granulates, and if the lining membrane is very thick, or slow in taking on a proper action, it may be touched with caustic.

[Ranula is the name given to a tumor seated under the tongue at the opening of the Whartonian ducts. Its consistence is very various, ranging from the consistence of jelly to that of the firmness of muscular tissue. In its early stage of development, it occasions so little inconvenience that the medical man seldom sees it until the tumor has made considerable progress. It may occur at any period of life from infancy up to old age. Persons with scrofulous diathesis, or whose systems are in an ænemic condition, are most liable to it, yet I have sometimes seen it in those in whom no scrofulous taint was to be detected, and whose physiological functions were in a state of activity. The first inconvenience resulting from the enlargement of the tumor is the difficulty of chewing. The power of speech is also sensibly affected. The tumor may, and often does, attain a large size—in some cases filling a large part of the mouth, lifting the tongue, doubling it back, and protruding downward under the jaws. When it has attained a large size, it becomes painful, is apt to inflame, and may suppurate, producing a very fetid breath, and a constant druling of the saliva, the patient instinctively refusing to swallow it.

In other instances, its development is entirely downward, spreading under the jaw in front and on the sides of the neck, in which case it may be mistaken for some other disease, and is often so erroneously treated. Occasionally the tumor may enlarge to such an extent, as to almost or quite stop breathing, when, of course, an operation is imperatively demanded. If the tumor is encysted with a fluid, it may be punctured, and afford the patient immediate relief; if the contents are solid, then excision is to be relied on.

As to the real nature of ranula, the profession has always been much divided, and I shall not enter into a lengthy examination of the various arguments which have been adduced by the partisans who have written upon the subject. The origin of the disease is in the Whartonian ducts, yet I am far from thinking that it is occasioned by a stoppage of the orifices of those ducts as has been asserted by some

very excellent writers, since we can easily observe for ourselves the continued flow of the normal secretion, especially if a little salt be placed on the tongue. The tumor is a cyst, and there is but little doubt that the microscope would develop the epithelium usually lining cystic tumors.

When once developed, excision, as well as cauterization, fails to effect a cure. In many instances they develop in a day or two after excision, and the cautery effects no more good than the knife. Seton wires, the shirt button of Dupuytren, and other similar means, fail in the great majority of cases. When these tumors are punctured, the relief can only be temporary, and setons passed through them often occasion intense inflammation.

The following cases will exhibit the treatment which I have found to be most successful:

Case I.—In the summer of 1854, J. T., of Harrison county, Ky., presented himself for treatment at Newton's Clinical Institute. Upon examination I found a large ranular sac extending across the anterior base of the mouth, filling up the cavity even with the teeth, elevating the tongue, and pushing it back, so as to occasion much difficulty in both masticating and swallowing. The disease had been progressing nine months, though the general health was but little impaired. All the bloodvessels of the part were much engorged, and in a varicose condition. The constant pressure of the tumor upon the gums had caused considerable induration, which might have led the inexperienced surgeon into error of diagnosis.

I immediately punctured the sac with a sharp bistoury, when there was discharged by the sac about three drachms of a sero-mucous fluid. On the second day the sac had filled again, and was as troublesome as before. It was again punctured, and again discharged about three drachms of a glairy fluid. I then injected the sac with a saturated solution of sesquicarbonate of potash, and filled the cavity with lint, so as to keep it distended, the object being to bring the caustic in contact with as large a surface as possible. This operation caused the patient much suffering; notwithstanding which I repeated it on the third day, when the inflammation became so great that I was compelled to desist; and for the next three days I used the lint only. After the inflammation had been reduced, I resumed the injection for four days more. This established copious suppuration. I continued to use the injection, though greatly weakened. The distension by lint was also decreased, and the sac readily healed by granulation. The cure was effected in seventeen days, and has remained permanent until the present time.

Case II.—A. W., of Woodford county, Ky., was also treated at Newton's Clinical Institute, for a similar affection, except that it had assumed the malignant form, and was, of course, more complicated. In this case, the sac had filled with a fungous matter; the base of the mouth was uneven, and generally indurated; only a small soft place indicating the existence of the sac where not completely filled with the fungous matter. The disease had been progressing for a year, occasioning much pain. It was greatly inflamed when I first saw it.

Finding that the sesquicarbonate of potash would not take hold of the fungous kindly, I was induced to substitute for it the sulphate of zinc, which I applied in the form of a saturated solution, injecting it into the cavities and small sacs after they had been punctured, and, as in the case of J. T., stuffed them with lint. As so much of the surface had to be acted on by the zinc, I was compelled to cover it over with lint to prevent its dilution by the saliva. This application and dressing was made five times on alternate days; at the end of which time (ten days), the patient was discharged cured, and, up to the present time, has had no return of the disease.

This form of ranula may be easily mistaken for cancer of the mouth, and no doubt many cases of it have been treated as such. It is a well known fact, that, under ordinary allopathic treatment, this disease is seldom radically cured. Though I have treated many cases, I have not yet made a failure, and I am convinced that I have indicated the best treatment.—R. S. N.]

Fatty tumors occasionally grow in the situation of ranula, and present characters so similar as to be distinguished from it with difficulty by external examination. The best way of deciding the question is to make an incision, which, in the event of the swelling proving solid, may be extended sufficiently for its removal.

The Lips afford subject of surgical treatment chiefly on account of congenital malformations and cancerous ulceration. The former of these are usually comprehended under the title of Hare-Lip. They consist in fissures of the upper lip, varying in extent and number, and either simple, or more or less complicated with malformation of the jaw and palate. The simplest form in which they are presented is that of a single fissure, extending from the edge of the lip to its connection with the gum, and generally seated a little to one side of the mesial plane. In double hare-lip, there are two such fissures, with an intermediate portion of lip, which varies in size. The imperfections of the palate consist in a longitudinal split or division, which is either confined to the soft part, or extends throughout the whole partition between the nose and mouth. This Split Palate may exist independently of hare-lip, but rarely does so. The malformation to which

the jaw is liable consists in a projection of the central part that holds the cutting teeth, forming a tumor from which the teeth grow out at a right angle to their ordinary direction. In most cases of this kind the projection comprehends an equal portion of both superior maxillary bones, the portion, namely, which in the lower animals is occupied by two distinct bones, the *ossa incisiva* or *intermaxillaria*. It forms a round knob, connected by a narrow neck to the septum of the nose, covered with a firm substance, similar to the gum, and having at its anterior part a similar snaped, but smaller sized, appendage, which seems to consist of the tissue that should have constituted the lip. The fissures on each side of this knob meet together behind it, and are then continued single through the palate backward. Instead of this conformation there is sometimes merely an overlapping of one edge of the split gum over the other, and the degree to which the projection thus formed takes place is extremely various.

Fig. 148.

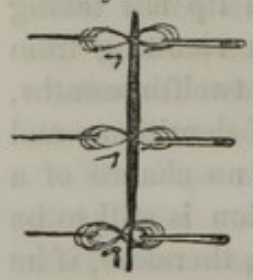


The impediments to deglutition and articulation, and the deformity which results from these imperfections, render their complete and early reparation very desirable; but several circumstances in respect to the age of the patient, must be taken into consideration before any operation for this purpose is attempted. Infants before the sixth month, especially if weak or irritable, are apt to die from convulsions or exhaustion occasioned by the pain, hemorrhage, and struggling which attend it; and beside this danger, there is another of less magnitude, which is the risk of union between the edges of the lip not taking place or being destroyed, in consequence of overaction resulting from the excitability of the patient. Between the sixth and twelfth months, another source of irritation occurs from the process of dentition; and for some time after this, though there may be little or no chance of a fatal issue, failure in effecting the object of the operation is still to be feared from the irritability of the parts. The surgeon, therefore, if he has his choice, should not operate before the child is two or three years old, and in no case ought he to do so before the fifth month, or during the process of dentition, until all the incisors at least have appeared. So long as the child is at the breast the operation, of course, cannot be performed; and it must consequently be weaned, if an early attempt at reparation should be determined on. When the jaw is preternaturally projecting, the prominent portion must be either reduced to a proper level by continued pressure, or removed by the knife. If of small extent it may be treated in the former way, but if at all considerable it requires the latter; and it is evidently proper to execute this preliminary part of the process as soon as possible, in order to render

the condition of the lip more favorable for union when the time for attempting it arrives.

The operation must be varied in some respects according to circumstances, but always essentially consists in joining the edges of the lip after making them raw by paring the respective surfaces. This may be done by means of scissors, or by embracing the lip between the blades of forceps and shaving off the portion of the edge that is allowed to project beyond them, or lastly, by seizing the lip with the finger and thumb, transfixing it with a knife a little above the angle where the two edges meet, and then removing a slice of the requisite extent or thickness. This last mentioned mode is on many accounts the one that ought to be preferred, and particularly because it enables the operator to regulate the shape of the cut surfaces more accurately than any other. The margins of the fissure present a convex outline, which, if allowed to remain, would cause the edges, when joined, to form an unseemly angle in the lip at their point of meeting. The respective surfaces should, therefore, be made straight, or rather slightly concave, so that when brought together they may give the lip its natural fullness. In performing the operation, the surgeon, holding the side to be cut, pushes the knife, which should be a bistoury, through it a little above the angle that is formed with the opposite one, and by a steady motion of the blade carries it downward until the whole of the convex edge is removed. He next shaves off a similar portion from the other side, and lastly unites the two raw surfaces by means of either the twisted or the interrupted suture. Silver pins with movable steel points, or hare-lip pins, as they were called, used to be employed for this purpose, but common sewing needles or lace pins are on many accounts much more convenient. The heads of the former should be covered with sealing wax to facilitate their introduction. Two are required in general, and at most three. One ought to be inserted close to the margin of the prolabium, or where the colored part of the lip begins, and so deeply as to leave little more than the mucous membrane not included. Another, or two more if necessary, being introduced in a similar way, a silk thread is wound round each needle separately so as to draw the edges into close contact. The points of the needles are easily broken off, and no dressing is required for the wound. I generally employ one needle at the margin of the lip, or two stitches of the interrupted suture. The needles may be taken out on the fourth day after the operation, but the cheeks should be supported for a week or even longer by a strap of adhesive plaster placed across the face.

Fig. 149.



In cases where there are two fissures, the operation that has been

described ought to be performed first on the one, and after it is firmly united, on the other, unless the intermediate portion is so small as not to reach the margin of the lip, in which case both of its edges, and also the corresponding ones, should be made raw at the same time; three needles being then introduced, one at the margin of the lip, one near the nose, and one in the middle passing through the apex of the triangular piece.

Split-palate does not admit of any remedy for the division of the hard part, except the closure of the communication between the nose and mouth by a piece of silver, enamel, or other substance so fitted as to remain in it without shifting. Fissure of the soft palate may be united in favorable cases by an operation similar to that for the hare-lip, but which is exceedingly difficult of execution, owing to the situation of the parts, their mobility, and the involuntary efforts of the patient. It would be impracticable, except in adults possessed of considerable fortitude, and in cases where the state of the parts is favorable to union, the difficulty of course increasing with the width of the breach. The edges may be made raw by means of either the scissors or the knife, the latter of which is the most convenient. As it is impossible to employ the twisted suture, stitches must be introduced, and for this purpose various instruments and modes of procedure have been contrived. The best method on the whole appears to be the simple one of using a common curved surgical needle, and guiding it with a pair of strong dressing forceps. The patient for some days after the operation must abstain from food, except what is absolutely necessary, and this should be of a fluid kind. Several repetitions of the process have repeatedly been required to complete the union of the whole fissure, and therefore the failure of one attempt or more ought not to occasion discouragement. Small apertures in the soft palate resulting from ulceration may be closed by repeated applications of the cautery to their margins.

[Hare-lip has been a common deformity in all nations, and during all past time. Its successful repair has been left for the accomplishment of modern surgery.

I do not propose to go into a history of the many causes which may give rise to this congenital deformity, though there is no doubt of its being a product of maternal sympathy. Very much discussion has been elicited on this point, but I imagine that the above position is now very well established.

Mr. S. D. Anderson and wife, of Rainsville, Illinois, visited Newton's Clinical Institute, in November, 1856, having with them three children, all affected with hare-lip. Neither of the parents, nor any of their ancestors, had been thus troubled; notwithstanding which, Mrs. Anderson had given birth to five children, three of whom had

hare-lip. Two of these she had lost, and the remaining three were presented for operations in the Clinic. The eldest, a boy of about twelve years of age; the second youngest, a girl aged four, and the third an infant eight months old. The parents and children were all in a healthy condition. The mother states that she was frightened when pregnant with her first child, the consequence of which was hare-lip in the child; and that the constant regret and sympathy for him had produced the malformation in her subsequent children—each adding to the horrible feelings with which she was troubled, and thus more surely inducing it in the next.

In operating on children, it is found difficult to keep them under the influence of chloroform, and I am of the opinion that it should be dispensed with in children under ten years of age, unless the constitution is very delicate. In the cases above referred to, I administered chloroform to the eldest, and experienced more trouble in operating on him than in both the others, notwithstanding their youth.

Quite a variety of hare-lip is met with; in fact, scarcely two cases are the same in all respects. In some, there is but a single fissure; in others, it may be double; and, very rarely, there may be three. Again, it may be short, or it may reach up into the nostril; the soft palate may or may not be fissured; and so the bony palate may have one or two fissures, or none. The maxillary bones may or may not be contorted. The incisor teeth may be displaced and curved outward, or they may be natural; they may shoot out in the cleft, or to one side. Bony excrescences may or may not interfere with the perfect closure of the parts. In short, it is rarely that we can find two cases exactly alike, and, of course, the exact process of operating will vary accordingly.

One of the first considerations is to properly prepare the bony rim over which the lip is to be united. If the incisor teeth have been developed, it will generally be found advisable to remove them at once, and if the alveolar process has curved outward, it will be best to remove so much as will prevent any unseemly prominence after the wound has been healed.

If there is but one fissure, and it not extending into the nostril, nothing will be more simple than the necessary operation. There is, in the first place, a choice of instruments, and upon this point very much depends. Mr. Butcher, Surgeon to Mercer's Hospital, Dublin, who has recently published a very excellent work, on the subject of hare-lip, prefers the scissors to the knife—a view to which I decidedly dissent. My objections to scissors are, that they must always contuse the surfaces through which they pass, from the very nature of their construction. Were it possible to get scissors with scalpel blades, this objection might be obviated; but, as such an instrument is out of the

question, we must prefer the knife, if we seek the best and most appropriate instrument.

I am greatly surprised that so good a surgeon as Mr. Butcher should thus recommend the scissors. The more the edges of the wound are contused, the less perfect will be their healing or union. And this fact alone would prejudice me against the use of the scissors, when a good knife was to be procured. Again, the incisions should come to an acute point, which is not to be accomplished by scissors. If the point is not acute, when the union is effected there will be an uneven cicatrix, which need not follow the operation where a good knife has been used.

The knife should be thin, delicately pointed, with the point in the center, and the blade thin, and the edge smooth—in the finest order. There should also be provided, three hare-lip pins, or small needles will answer, the points of which may be broken off after they have been inserted. Supposing the case to be a single fissured hare-lip, the surgeon, having first removed any teeth, or long eminences, which may be in the way, dissects the lip from the bony surface below for a short distance around the edges to be pared. Standing over and behind the patient, which, if over ten, shall have been previously ætherized, and fixing in his mind the line of the incision, introduces the knife, and thence passes it smoothly down to the end of the fissure, slightly curving his incision, so as to give rather a convex, than a straight, surface, and by no means a concave one. Many very excellent operators introduce a thin wooden spatula between the lips and the bone and cut down on it. I think, however, that the under surface is thus always somewhat contused, and hence I prefer to dispense with it and make my incision from the apex to the base of the fissure. This incision should be made on both sides, of course, paring off only enough to bring the surfaces in exact union. The assistant will compress the coronary artery so as to staunch the incidental hemorrhage. The surfaces having been cleaned, and put in exact union, the surgeon then introduces a pin (the lowest), which should be made to dip down under the coronary artery to guard against hemorrhage; and in like manner, after it has been tied, the other two should be introduced, each dipping down nearly to the mucous membrane so as to prevent a gaping of the fissure on the internal surface. The sutures having been arranged, strips of adhesive plaster are placed over them, extending to the middle of each cheek, and firmly drawn together. This will prevent separation in consequence of crying or other movements of the parts by the child. If the patient be under ten, it must be rolled in a sheet so as to prevent its struggles. The fissure of the soft palate is united much in the same way, except stitches are substituted for pins. The bony cleft may be improved by a subsequent operation, but gene-

rally, if the patient is young, the constant pressure of the lips will nearly close the cleft. The children above referred to, were thus operated on. The straps and dressings not being interfered with till the end of the fourth day, when the pins were removed and straps applied. At the end of eight days all were discharged cured.

Where the hare-lip is double, of course the operation is double, and somewhat more difficult, yet the principle is the same. It is a question among surgeons whether one or both fissures of such cases should be operated on at the same time. I am governed very much by the character of the particular case in hand.

The fissures are never on the medial line, and often extend up into the nostril; but no matter how far up, the edges should be pared and the surfaces united. The chief object of the surgeon is to remedy the deformity, and his judgment must, in a measure, direct him to the attainment of the end. The deformity of hare-lip is a very disagreeable one, and I hope that of the next generation, none will be suffered to grow up without seeking to remedy it. The judicious and skillful surgeon need never fail in the operation, unless the parts are positively torn asunder, or some equally unexpected accident should befall the patient. It, however, requires care and skill to leave only slight traces of the previous deformity. I have operated on many patients from different parts of the country, and I am positive, when I commend to the profession this plan of operating.—R. S. N.]

CANCER OF THE LIP.

Cancerous ulceration frequently occurs in the under lip, but hardly ever affects the upper one, except by extending to it from the other, which seldom happens. This difference probably depends on the greater or more frequent irritation to which the lower lip is exposed, by its situation, and mobility. The disease rarely commences before middle age, and is met with more frequently in males than in females. It originates in different ways, at one time being preceded by a hard, warty excrescence, possessing the carcinomatous texture, and at another, appearing first in the form of a superficial chap or excoriation. The cancer once established, increases progressively, but with variable rapidity, being attended with burning or lancinating pain, and surrounded with a remarkable induration. The aspect of the sore is extremely various, but always dissimilar from that of a sound granulating surface. All sorts of applications and modes of treatment, except removal of the diseased parts, are found quite unavailing; but in proceeding to this extreme measure, it is necessary to beware of regarding as cancerous, ulcers not possessed of malignant action, and obstinate merely on account of the peculiar circumstance of their situation. Ulcers occurring on the lip at or before middle age may be

generally traced to the influence of local irritation, proceeding from the motion of the part, or the asperities of the teeth; and in all cases, unless the cancerous characters should be very distinct indeed, it is right to try the effects of rest by confining the lip with a bandage, and of removing and sharp points of the teeth that may be found to project, by filing or extracting them. While this trial is made, the sore should be dressed with black-wash, or solution of the sulphate of zinc, care being taken at the same time to remedy any derangement that may be discovered to exist in the state of the secretions.

If it is determined to remove the sore, there can be no hesitation in choosing excision as the best mode of doing so. Caustic of different kinds has often been used, but, besides being tedious and painful in producing its effect, it is always apt to aggravate the disease by eradicating it imperfectly, and irritating the part which is allowed to remain. The method of excision generally followed, is to cut out a triangular or V shaped piece of the lip, by making an incision obliquely downward on each side of the ulcer, so that the one may meet the other at an angle sufficiently acute for permitting the cut surfaces to be brought together and united, as in the operation for hare-lip. When the cancer is of no great extent, and the lip possesses considerable fullness, this procedure is very convenient, and renders the resulting deformity little perceptible. But when a large part of the surface of the lip is affected, there would then be removed so great a portion of the sound structure as must prevent or very much impede the union of the cut edges. In such cases, the method proposed by M. Richerand is certainly to be preferred. It consists in cutting away the morbid part alone with curved scissors, after which the skin and mucous membrane may be stitched together. Ulcers extending over almost the whole surface of the lip may in this way be completely excised, with hardly any deformity or inconvenience. On all occasions the surgeon should take care that the whole of the induration surrounding the sore is removed, and he ought to abstain from operating when the glands under the chin, or in the neck, are affected.

TONGUE.

The Tongue is liable to ulceration in consequence of chronic derangement of the digestive organs—the injurious effect which is produced on the system by the excessive use of mercury—and the influence of local irritation, such as that proceeding from sharp points of the teeth. In the first of these cases, the ulcers are generally small, round, and yellowish-colored; they are seated chiefly on the edge and inferior surface of the organ, which usually appears somewhat swollen and marked with the shape of the teeth. Their remedy consists in an alterative course of diet and medicine, together with some [illegible]

application, such as powdered borax or alum. The ulcers that are met with in persons whose constitutions are vitiated by mercury, present a bluish color, and are extremely irregular in shape. They affect the edge of the tongue especially, and appear in the form of chaps or superficial excoriations. The sulphate of copper used once a day, either solid or in solution, is the best local application; and the gradual improvement that takes place in such states of the system through time and a proper mode of living, must be trusted to as the means of affording permanent security against their continuance or recurrence.

[The most effective remedy for mercurial ulcers, is the use of one of Sanders' batteries for the electrolysis of the mineral from the system. It is quite true that an alterative course of medicines, well directed for a great length of time, will expel the mineral to a very great extent. But a good galvanic battery rightly applied, will accomplish the work of months in a few minutes, and in a very effectual manner.—R. S. N.]

The sores which result from irritation of the teeth occur, of course, at the part exposed to its operation. They present various appearances, according to the circumstances of the case, but are easily recognized by the existence of a tooth presenting a sharp edge in their neighborhood. The treatment obviously requires immediate removal of the irritation, by smoothing the rough surface of the tooth, or extracting it; and advantage is also derived from touching the ulcer with nitrate of silver, or the sulphate of copper, in order to destroy its morbid sensibility.

Cancer of the tongue is occasionally met with chiefly at advanced periods of life, and in females more frequently than males. It is attended with the usual characters of hardness and pain, and leads to similar disease of the glands of the neck. The only remedy is extirpation, and this unfortunately can seldom be effected, owing to the diffusion of the morbid tendency. The means employed for this purpose are the ligature and the knife. The former must be used when the cancer is so situated as to render the hemorrhage, to be expected upon its excision, profuse or difficult to restrain, as at the back part or root of the tongue. A double ligature is passed under the base of the ulcer, with the assistance of a sharp-pointed curved needle fixed in a handle. The threads are then tied as tight as possible, so as to include one half of the disease in each. The pain that follows is intense, and until it abates, which seldom happens before the expiration of several hours, should be mitigated by large doses of the muriate of morphia. When the cancer is seated on the apex or edge of the tongue, it may be safely cut out with the knife or scissors, after being grasped and forcibly stretched by means of a hook or hooked forceps. But the

result of experience forbids almost any hope of effecting permanent relief by extirpating cancer even of this part, and of course if possible still less when the disease is seated farther back.

[I have made permanent cures of several cases of cancer of the tongue, notwithstanding the opinion of Mr. Syme to the contrary. The tongue must be laid hold of by a pair of forceps with rather broad and deeply indented blades, and drawn out, so as to bring the cancer outside of the mouth; then apply the chloride of zinc, and fill the cavity with lint. The tongue is to be held out until the zinc has been dissolved—although the application causes very much pain.—R. S. N.]

The Frænum of the tongue is sometimes originally formed so as to present the appearance of a narrow white band when the apex is turned backward, and more or less impedes the motions of the organ. This imperfection is easily remedied by cutting the edge of the tight frænum, and then rupturing the remaining part of it so far as seems necessary, by pushing the tongue backward. When children are late of beginning to articulate, whether this be owing to mental weakness, or any other cause, the relatives are apt to suppose that the frænum is confining the tongue, and it is necessary to be cautious in acceding to their wish of having it divided, as the raninal arteries might be opened by making an incision for this purpose in a natural state of the parts.

The tongue is liable to a general enlargement of both a chronic and acute nature. The former is merely an excessive degree of the swelling, which, as has been already mentioned, proceeds from the constitutional effect of mercury, and is to be remedied by the same means. The latter, or acute form of the disease, is very rare. It possesses an inflammatory character, and not only occasions great inconvenience by impeding deglutition and articulation, but has even proved fatal by causing suffocation. The most effectual remedy consists in making two or three deep longitudinal incisions into the upper surface of the distended organ. Relief is thus very speedily obtained, but if it should not be so, soon enough to protect the patient, from the risk of suffocation, tracheotomy ought to be performed without delay. In cases of less urgency, leeches and fomentations applied to the throat, prove sufficient.

TONSILS.

The morbid conditions to which the tonsils are chiefly subject, are inflammation, suppuration, ulceration, and chronic enlargement.

Inflammation of the tonsils constitutes the most common kind of sore throat, *Cynanche Tonsillaris*. It is induced by exposure to cold—is recognized by pain and swelling in the region of the glands, particularly observable during deglution—and is remedied by general

or local bleeding, cathartics, and, after the intensity of the symptoms has been subdued, counter-irritation.

When suppuration takes place, the matter is not confined to the gland, but extends into the surrounding cellular substance, and forms a large diffused tumor of the fauces, which depresses the palate, renders swallowing almost impossible, and sometimes interferes with respiration also. If the disease be allowed to follow on its own course, evacuation of the matter is accomplished sooner or later by the natural process; but, in order to hasten the patient's relief, and prevent the risk of suffocation that might attend the fluid escaping into the throat, while the patient is not prepared for it, as during sleep, it is often thought right to puncture the abscess. In doing this, the situation of the carotid artery must be kept in mind, as it would be exposed to injury, if the knife were directed outward, in the line of the ear. If it is introduced a little nearer the mesial plane than the wisdom tooth, and pushed directly backward, there will be no possibility of wounding the vessel; and it seems safer to proceed on this principle, than to confide in the instrument which has been long in use for this particular purpose, consisting of a lancet blade inclosed in a canula, from which it may be protruded, more or less, by means of a screw at its other extremity.

Ulceration of the tonsils is sometimes of an acute, but much more frequently of a chronic, nature. Astringent gargles, and attention to the general health, are sufficient for its remedy in ordinary circumstances; but, when obstinate, it must be treated more actively, by touching the surface every day or two with the nitrate of silver, a strong solution of the sulphate of copper, or some other application powerful enough to change the morbid action. Along with these local measures, an alterative course of medicine and diet is frequently required.

Chronic enlargement of the tonsils generally results from one or more attacks of inflammation. It occurs more frequently in females than males, and usually takes place at or before the period of puberty. In most cases both of the glands are enlarged, but one, in general, exceeds the other in size. The swelling is firm in consistence, pale in color, but often streaked with vessels, and unequal on its surface. There is great variety in the extent which the swelling attains, from the slightest perceptible fullness, to a magnitude that leaves hardly any space between the two tumors. The symptoms are, constant uneasiness in the throat, huskiness of the voice, noisy respiration, which is generally performed with the mouth open, and deafness, from obstruction of the Eustachian tubes. But what usually occasions the patient the greatest annoyance, is the frequent attacks of sore throat to which the morbid state of the gland exposes him; and

he is seldom aware of the enlargement, until it is discovered by his medical attendant.

The ordinary treatment for sore throat affords some palliation of this disease, but the only effectual remedy of it consists in removing the tumor. Caustic, the cautery, and the ligature, though they have all been often employed for this purpose, are decidedly less eligible means than the knife or scissors. The first two are tedious and painful in their operation; and the ligature, while it is liable to these objections, is also attended with great difficulty in its application, owing to the depth of the parts concerned, and the involuntary resistance of the patient.

The only ground of declining excision is the apprehension of hemorrhage; but, if the cutting instrument is kept parallel with the great vessels, there cannot be the slightest risk of this. It is not necessary to remove the whole of the tumor, since the portion that remains is soon diminished by absorption, so as to occasion no farther inconvenience. Curved scissors might be supposed the most efficient instrument for this operation, but on trial are found not to be so. They can hardly be made to cut through the whole thickness of the mass at one stroke, and it is extremely difficult to make a second, owing to the struggles which are induced by the bleeding. The tumor thus partially detached, hangs down into the pharynx, where it excites irritation that causes coughing or retching, and it has even happened that death resulted from this circumstance. The easiest and safest method is to seize the tumor with the hooked forceps, and having put it on the stretch, to cut away as much of it as seems necessary with a probe-pointed slightly curved bistoury. If the surgeon proceeds with decision, he may in this way be sure of completing the separation of the mass in two or three seconds at most.

TEETH.

The teeth generally begin to appear in the mouth between the seventh and tenth months, and generally present themselves in the following order: 1. The two front incisors of the lower jaw; 2. The four incisors of the upper jaw; 3. The two lateral incisors of the lower jaw; 4. The four anterior grinders; 5. The canine; and 6. The four posterior grinders. The process of dentition, particularly that part of it in which the teeth, by pressing upon the gum, induce absorption of it, and thus form a breach to allow their protrusion, is attended with irritation, which varies in degree, and produces effects of corresponding importance, both local and general. Uneasiness of the mouth, swelling and pain of the gums, inflammation of the eyes, and eruption of the skin, particularly that of the head, diarrhea, convulsions, and fever, are the symptoms most frequently observed.

Soothing measures, such as the warm-bath and gentle opiates, ought to be employed for allaying them, and whenever they are at all severe, the gum should be freely scarified where the teeth are supposed to be pressing on it. A convex-edged instrument answers best for this purpose, and it ought to be carried fairly down to the teeth in two directions, so as to make a crucial incision.

When the teeth decay, so as to lay open the internal cavity, and expose the sensible pulp to external irritation, pain, or Toothache, as it is called, usually commences. It is not constant, and varies extremely in the degree of its severity. Various irritations besides those of a local kind induce its fits, or occasional attacks, such as cold operating on the surface of the body, derangement of the digestive organs, or anxiety of mind. Pregnancy is observed to favor their occurrence. The process of decay which leads to this complaint may often be averted, by scooping out the dark-colored part of the tooth that surrounds the cavity, and filling the hollow with gold or silver foil, or gum mastic. Opium in substance or solution, some essential oils, as that of cloves, and also the strong mineral acids, when introduced into the hollow, often procure temporary relief from suffering; but in general, the only effectual remedy is extraction of the tooth affected. This operation is usually performed by means of either the tooth-key, as it is called, or powerful forceps, of which the blades are short, concave, and placed obliquely in regard to the handles. Many ingenious apparatus have been contrived with the view of pulling the teeth perpendicularly from their sockets; but a little attention to the shape and direction of the fangs will render it evident that this mode, granting it to be practicable, would not be convenient. In order to dislodge the roots, it is necessary that the alveolar processes should be broken more or less; and the best way of accomplishing this is to draw the tooth toward that side which makes the least resistance, at the same time raising it from its bed. Both the instruments that have been mentioned enable the operator to exert a force in this oblique direction. The forceps in the hand of one not practiced in their use, are apt to detach the crown of the tooth from its fangs, and must therefore be employed with caution.

After the process of decay has proceeded so far that the roots of the tooth alone are left, the patient is relieved from toothache, but exposed to other symptoms of a troublesome kind, in consequence of the irritation caused by the stumps, as they are called. These useless remnants become loosened in their connection with the jaw, and are apt to occasion similar effects to those which would proceed from foreign bodies in the same situation. Inflammation of the gum, leading to abscess (gumboil or parulis), suppuration of the cheek, followed by fistulous ulcers opening externally, ulceration or purulent discharge of

the nasal cavities, sore throat, and disorder of the digestive organs, are the most common of these; and their mere mention will be sufficient to show the importance of removing the stumps of decayed teeth. This is done by means of an instrument named a punch, which should be forcibly pushed into the socket close to the stump, in a perpendicular direction, and then, by moving the handle to one side, made to loosen and elevate it.

Hemorrhage occasionally occurs to a troublesome or even alarming extent after the extraction of teeth or stumps. The best application is dry lint forcibly pressed into the cavity, which proves much more effectual than the use of caustic or the actual cautery.

ABSCESS OF THE ANTRUM.

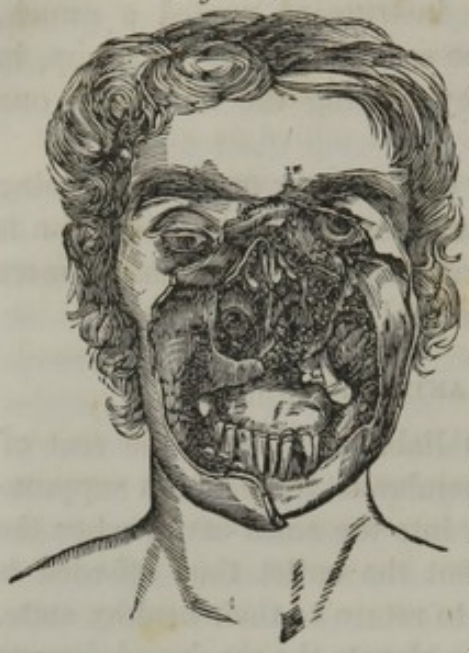
The cavity of the maxillary bone is liable to become the seat of abscess in consequence of the lining membrane taking on a suppurative action. The fluid escapes partially into the nasal cavity when the head is laid in the horizontal posture, but the outlet thus afforded is not sufficiently free to allow the parts to return to their healthy state. The bone is gradually expanded, so as to elevate the cheek and depress the palate; dull aching pains are felt at uncertain times throughout the face and head; and the superjacent integuments are usually thick and red. A dependent opening into the cavity may be easily formed by pulling one of the grinders, or a stump remaining in the place of one of them, as the partition between the bottom of the alveolar hollow and the antrum is so thin as to afford no resistance which a common probe is not able to overcome. In this way, however, little advantage is obtained, as the matter is still not evacuated with sufficient freedom, and it is usually found necessary to establish a more ample aperture by separating the cheek from the gum opposite the bicuspid teeth, and breaking down the anterior wall of the cavity, sufficiently to admit the point of a finger, which, owing to the weakness of the bone at this part, may be executed more easily than might be expected. The expanded bone slowly and gradually resumes its natural shape; and while this change is proceeding, a solution of sulphate of zinc may be injected occasionally.

TUMORS OF THE GUMS AND JAWS.

Excrescences of a firm substance, irregular surface, and usually whitish color, are not unfrequently met with proceeding from the gums. If allowed to pursue their own course, they increase in size, loosen the teeth in their neighborhood, and at length taking on a malignant action, prove fatal to the patient by causing hemorrhage, profuse discharge of matter, or excessive and long-continued pain. These growths, when small and within reach, ought to be freely cut away,

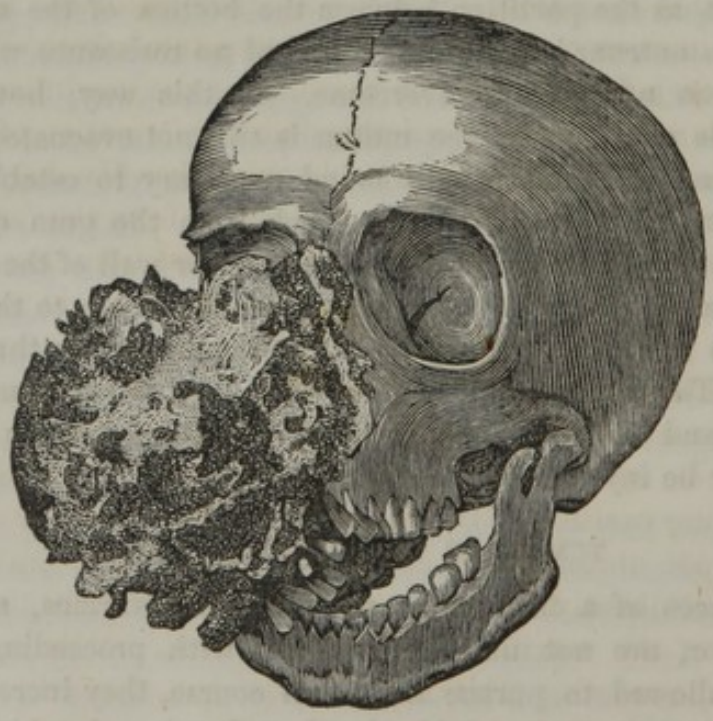
and the actual cautery or caustic potass should then be applied, so as to destroy, if possible, any tendency to their reproduction that may remain in the part. If the tumor extends to the alveolar processes, the adjacent teeth must be extracted, and the excision will require the assistance of cutting-forceps. In such cases the prognosis, as to the permanency of recovery, should be cautious, as attempts to eradicate the disease by removing the affected part alone are apt to be unavailing.

Fig. 150.



Both the upper and the lower jaws are liable to morbid degeneration of structure, giving rise to medullary and fibro-cartilaginous tumors. The former occurs more frequently in the upper than the lower, and generally extends to the bones of the nose and orbit; the latter is more common in the lower jaw in a still greater proportion. The medullary growth, as in other parts of the system,

Fig. 151.



is attended with severe pain, an unhealthy appearance, and in its more advanced stage, profuse fetid discharge or hemorrhage.

The fibro-cartilaginous production, though sometimes in the first instance the seat of uneasy sensations, usually produces no inconvenience except by its bulk, to which no limits can be set. At length occasional bleeding takes place from the surface, but this seldom happens until the tumor has existed for years, and attained a very large size. There is never any purulent or fetid matter discharged, and the substance of the mass remains as dense and entire as at the commencement of its formation. This kind of growth is usually met with in young persons between puberty and middle age.

The only method of relieving the patient from these tumors, whether of the one kind or the other, is complete excision. This used to be attempted by cutting out with saws, forceps, and chisels, the diseased mass alone, the adjacent part of the jaw being allowed to remain. Such operations, with hardly any exception, proved ineffectual in accomplishing a radical cure, as the smallest portion of bone possessing the morbid disposition, that was not eradicated, insured a return of the disease. The great improvement has been introduced into modern surgery of amputating the jaws when they become the seat of these formations, at the articulation, or at all events in a part of their extent which is perfectly free from enlargement, or any other indication of unhealthy action. The names of Grafe of Berlin, Dupuytren of Paris, Mott of New York, Crampton and Cusack of Dublin, and Gensoul of Lyons, are most deserving of mention for adopting and establishing this operation. It has been performed with almost uniform success in cases of the fibro-cartilaginous tumor both of the upper and the lower jaw, and also, on account of the medullary growth. From the nature of the bones entering into the formation of the upper jaw, complete eradication is practicable only when the disease is confined to the superior maxillary bone. Growths from the forehead and bones of the nose must be carefully distinguished from those that possess this limited origin, as no satisfactory result would attend their removal. In the case here represented the patient was urged to permit an operation, but fortunately declined to do so, since, on dissection, the disease was found to extend inward, so as to occupy very nearly the whole space belonging to the anterior lobes of the brain.

In performing excision of the superior maxillary bone, two incisions should be made through the cheek, one extending from the inner angle of the eye directly downward to the lip, the other beginning over the junction of the maxillary and mallary bone, and terminating at the angle of the mouth. The triangular flap thus formed is to be dissected from the tumor, and the margin of the orbit exposed. One blade of a large pair of cutting-pliers is then introduced into the nose, and the other into the orbit, so as to divide the nasal process of the maxillary bone. The connection with the malar bone is next separated

in the same way, and then the palate, previous to which one of the incisor teeth must be extracted if necessary. The surgeon having now deprived the bone of all its principal attachments, wrenches it out either with his hands or strong forceps. There is seldom much bleeding, but the patient should be seated during the operation, to prevent any risk of suffocation. No advantage is obtained by tying the carotid previously, and if it is desired to save the blood as much as possible, an incision ought to be made through the integuments between the neck of the jaw and the mastoid process, to enable the assistant to compress the internal maxillary artery, or the common trunk of it and the temporal. The only vessels that require to be tied are the facial and posterior palatine arteries, and the latter not always. The cavity of the cheek should be moderately filled with pieces of lint, and then the edges of the wound are brought carefully together by means of the twisted or interrupted suture. The deformity which remains after the cure has been completed is very inconsiderable, and the patient is able to speak, eat, and swallow with much less imperfection than might be expected. In the event of the cure proving permanent, an artificial substitute for the palate may be adapted to the cavity.

ON EXCISION OF THE UPPER JAW.

The great advantages derived from removing tumors of the lower jaw by cutting through the sound bone, completely beyond the limits of morbid growth, instead of vainly attempting to extirpate the disease, by digging it out from the center toward the circumference, naturally suggested the adoption of a similar mode of procedure with regard to the upper jaw. But the firm and complicated connections of this bone, together with its important share in constituting the mouth, nose, and orbit, and also the large bloodvessels distributed about it, presented such formidable obstacles to removal, that up to the year 1829, there was no instance on record of this operation having been performed. In that year I met with a case which seemed favorable for the purpose, and though it proved to be not so, from the disease extending beyond the maxillary bone, I proved, by the operation, the practicability of removing the upper jaw, and established a plan of proceeding, which, without any alteration except as to the subordinate details, has since been adopted by the profession.

[The following letter addressed to Dr. Duncan, is very expressive.—R. S. N.]

"You are aware that Osteo-sarcoma of the upper jaw bone is a complaint not very uncommon, and that its result has been hitherto uniformly fatal, whether the disease was allowed to follow its own course, or attempts were made to arrest it by digging out the morbid growth. Surgery, in short, has not been more successful in this case

than it was in regard to the same malady affecting the lower jaw, so long as its operations went no further than the confines of the tumor. I need not remind you with what ease and certainty osteo-sarcomatous tumors of the lower jaw are now removed on a different principle, viz: cutting through the sound bone; and there can be little doubt that similar growths of the upper jaw would be removed with equal advantage, provided they could be extirpated by excision of the whole bone affected. Attempts have accordingly been made to accomplish this amputation of the superior maxilla, but have hitherto failed, chiefly owing to the uncontrollable hemorrhage which I have heard obliged one operator to desist even after he had tied both carotids. A case lately occurred in which I overcame this difficulty; and as the plan of operation followed on the occasion in question seems to me such as renders the process very easy and safe, I think the readers of your Journal may consider it deserving of their attention.

William M'Donald, aged fifty-four, recommended by my friend Mr. Davidson, of Dundee, entered the Surgical Hospital on the 11th of May, on account of a large swelling of the left cheek. The tumor was about the size of a turkey's egg, firm, projecting, and circumscribed. It seemed to occupy all the maxillary bone, extending into the mouth, but not passing beyond the mesial plane of the palate, and reaching up to the lower edge of the orbit. It had existed ten months, and was increasing. In these circumstances Dr. Ballingall and Mr. Nasmyth agreed with me in thinking that the patient's speedy destruction was inevitable if the disease were left to itself; that an attempt to dig out the tumor would be inflicting pain without the smallest prospect of permanent benefit; and that the case was a very fair one for practicing excision of the entire superior maxillary bone.

In the presence of the gentlemen above mentioned, and the pupils attending the hospital, I proceeded to do so on Friday the 15th.

The patient being seated on a chair, I made a crucial incision by cutting from the zygoma to the angle of the mouth, and from the inner angle of the eye to the angle of the jaw. Having dissected back the flaps thus formed, so as to bring the external surface of the tumor completely into view, and tied the facial artery, together with two transverse facial branches of the temporal, I partially divided the malar bone with a saw, and completed its section by means of the cutting-pliers. I then, partly by dissection, partly by pushing with the handle of the knife, separated the contents of the orbit from the floor of that cavity; next placing one blade of the cutting-pliers in the nose, the other in the orbit, divided the nasal process of the maxillary bone; and, lastly, cut through the hard palate in a similar way, having previously extracted one of the incisor teeth.

So far I had calculated that the operation would be nearly bloodless, but to prevent troublesome hemorrhage in executing what remained, it seemed to me proper to get command of the internal maxillary artery. In order to do this, I made a small incision below the ear, and dissected through the parotid gland, so as to enable Dr. Ballingall to compress the vessel between the point of his finger and the neck of the lower jaw. I then readily and fearlessly turned out the tumor; and we were pleased to see that the artery was as effectually controlled as the femoral ever is by the best applied tourniquet. We were less pleased to observe that the morbid growth was not confined to the maxillary bone, but extended to the sphenoid, in the base of the skull.

Having done all that we proposed, and all that could be done, we determined to try nothing more. I therefore brought the edges of the cheek together by sutures, and sent the patient to bed.

The patient suffered no constitutional disturbance, and was walking in the garden on the third day after the operation.

Though there is still no appearance of the disease recurring, there can be little doubt that the result will be no exception to the usual one of such cases; but knowledge of the facts that the inferior maxillary bone may be completely excised—and that the hemorrhage of the internal maxillary artery may be effectually restrained by pressing the vessel at its origin upon the neck of the jaw—may be useful in future, by inducing surgeons to practice excision while the disease remains within accessible limits.

I remain, my dear sir, very faithfully yours,

JAMES SYME."

In 1830, M. Gensoul, of Lyons, published a treatise on removal of the upper jaw, and soon afterward honored Edinburgh with a visit, when I had the pleasure of seeing several tumors on which he had successfully operated. He employed a chisel and mallet for detaching the osseous connections, but did not convince me that these means were preferable to the more simple and efficient agency of the cutting-pliers. I consider it now unnecessary to reprint any of the particular cases in which I have performed the operation; but may offer some remarks upon the diagnosis of cases proper for its employment, and also upon the mode of execution most conducive to a satisfactory result.

The tumors of the upper jaw which require its removal, originate from the substance of the bone, and do not extend their roots beyond its limits. The firmer the consistence of these textures is ascertained to be, the more confidently may permanent benefit be expected from the operation.

The tumors of the upper jaw for which removal of the bone is not

proper, are: 1. Those that grow from the gum, or alveolar region, and have not extended their roots beyond these limits; 2. Those of a malignant kind, which originate from or extend to the base of the cranium; 3. Cysts containing serous fluid, developed within the substance of the bone, and existing either independently or in connection with teeth remaining latent in the jaw; 4. Abscesses of the maxillary antrum.

It is more especially with regard to the second and third of these conditions that caution must be exercised in avoiding the operation, since it could not afford complete or permanent relief from the former; and is altogether unwarrantable for the latter, which admit of effectual remedy on much easier terms. In malignant cases suspicion may be excited by the soft consistence and rapid growth of the tumor, and by the unhealthy aspect of the patient. But one or more of the following circumstances should be held as an insuperable objection to operating. These are: 1. Enlargement at the root of the nose; 2. Obstruction of the nostril on the affected side, especially if it has appeared at an early stage of the disease, and is attended with the appearance of a polypus in the cavity; 3. Displacement of the eyeball outward or forward.

The cysts which are formed within the maxillary bone, usually have an osseous covering over the greater part of their extent, which is apt to suggest the belief of their being solid tumors; but, when carefully examined, is found at some points to be either deficient or so thin that it yields under the pressure of a finger, as if composed of thick paper or parchment. This thin portion of the parietes is generally seated either in front over the gum, or in the palate. The remedy required is a free drain for the fluid, and may be formed either by cutting from within the mouth, or by elevating the cheek, and making an opening between it and the gum. If there is room for selection the latter position is preferable, and, to prevent any risk of the aperture closing, a small elliptical portion of the membranous or osseous parietes should be cut out.

In performing the operation, the first object is to expose the bone sufficiently for allowing its connections to be divided. For this purpose, an incision through the cheek from the malar prominence to the angle of the mouth, slightly curved, with the convexity downward, will be found the most convenient mode of dividing the integuments, as it affords ample space, and, when healed, may have any trace which it leaves concealed by the whisker of the patient, if a male, or the string of a cap, if the subject of operation be a female. The osseous attachments should be divided in the following order: 1. The malar; 2. The nasal; 3. Those of the palate. The malar bone may be either detached entire along with the superior maxillary, by separating its connections with the frontal and temporal bones, or divided through its

body from the margin of the orbit downward. The latter mode is equally effectual in removing the disease, and has the advantage of causing much less alteration of the patient's countenance. It may be easily accomplished by making a notch with the saw, and then applying the cutting-pliers.

The operation, when thus performed, and by a single incision, is wonderfully simple when compared with the complicated procedure of those who detach the malar bone from its frontal and temporal connections, and cut through the cheek in four or five different directions. The hemorrhage is very inconsiderable, and, so far from warranting ligature of the carotids, does not even require pressure on the internal maxillary artery, as in the first instance I believed to be necessary.

Excision of the lower jaw is an easier, and less formidable operation. The mode of performing it must be varied according to the size and situation of the tumor. It is usually either confined to one side of the bone, or engages one side more than the other. The base is the part most frequently affected, but the ramus is sometimes implicated, so as to require disarticulation. The best direction for the incisions through the cheek, is first downward from that angle of the mouth which is opposite a sound part of the jaw, then along the base as far as the tumor extends, and, if necessary, up along the posterior margin of the ramus to the condyle. The flap thus formed having been separated from the tumor, the jaw is partially cut through with a small saw, and completely divided by strong cutting-pliers. The surgeon then grasping the detached portion turns it outward, and separates its connections with the muscles and mucous membrane of the mouth. If the symphysis is included, means must be employed to prevent suffocation from the tongue being drawn back by the muscles of deglutition owing to the power which kept it forward having ceased to act. As it is only for a minute or two that there is any risk of this occurrence, the best mode of proceeding is to seize the tongue with a towel, and confide it to an assistant until the tendency to retraction ceases. The only arteries that require to be tied, are the facial, and the transverse branches of the temporal, in the case of cutting over the ramus. The cavity of the wound should be gently filled with pieces of lint, after which stitches or needles are to be introduced so as to retain the cut edges in accurate contact. If it is necessary to remove the bone at its articulation, the operation should be conducted as has been described until the jaw is divided on that side of the tumor where it remains sound. The tumor is then pulled outward, while its connections with the mouth are detached, and at the same time depressed so as to bring the coronoid process within reach. The attachment of the temporal muscle having been divided, the bone is more fully depressed, so as to expose the articulation, into which the knife is carried close

round the condyle, in order to avoid the internal maxillary artery, which crosses the neck of this process on its inner surface about half an inch below the joint. The remaining connections are lastly divided, and the operation concluded as has been directed.

The small amount of deformity and inconvenience of any kind occasioned by the excision of the greater part of the lower jaw, can be conceived only from actual observation, and, as well on this account as the relief afforded to the patient from an oppressive and ultimately fatal disease, the operation may be regarded as one of the greatest improvements in the practice of modern surgery.

The mouth is often subject to enormous tumors, which require heroic operations. In 1828 a young man, otherwise in good health, came to me to be relieved of a tumor which had been growing in his mouth for some time. He had been annoyed with it, but not seriously inconvenienced, for several years, the tumor having began to develop when he was about sixteen years old. Several surgeons had examined it, but afforded him only partial relief. He had applied to a surgeon, who supposing it to originate from some disease of the teeth, extracted three of them, from which time the tumor grew much more rapidly. When I first saw him he was a frightful looking creature, and threatened with instant suffocation.

Fig. 151.



The mouth was placed diagonally across the face, and had suffered such a monstrous distension as to measure fifteen inches in circumference. The throat of the patient was almost obliterated in appearance, there being only about two inches of it visible above the sternum, so that the cricoid cartilage of the larynx was on a level with that bone. When the tumor was viewed in profile it extended eight inches from the front of the neck.

It completely filled the mouth, and occupied all the space below it, from jaw to jaw. The tongue was thrust out of its place, and lay between the teeth and cheek of the right side. The only portion of the jaw not implicated in the disease was the right ramus and base of the same side, from the bicuspid teeth backward. The tumor, where covered by the integuments, was uniformly very firm, and for the most part distinctly osseous. The part which appeared through the mouth was a florid, irregular, fungous-looking mass of firm consistence, from which an alarming hemorrhage had occasionally occurred; and

for the last three or four weeks there had been almost daily a discharge of blood to the extent of one or two ounces. Notwithstanding the great bulk of the tumor, the patient could move his jaw pretty freely in all directions. With the exception of the disease now described, Penman enjoyed good health. He was a tall, well made, though much emaciated, intelligent young man, and possessed uncommon fortitude.

Having carefully examined the tumor, I undertook to remove it; and this proposal meeting with the approbation of Dr. Abercrombie and Professor Ballingall, was, with the assistance of the latter gentleman, carried into execution on the 7th of July, in the presence of Dr. Abercrombie, Professor Russell, Dr. Hunter, etc.

The patient being seated on a chair, which posture I preferred, as being most conducive to the prevention of suffocation from hemorrhage during the operation, I made an oblique incision by running a sharp pointed knife through the lip, from the right angle of the mouth to the base of the jaw, where I proposed to divide it, viz: at the second bicuspid tooth, which had been previously removed. Having exposed the external surface of the bone at this part, I divided it partially with a saw, and easily completed what remained by means of the cutting-pliers. The inferior coronary artery, which Dr. Ballingall had prevented from bleeding by compressing it in the lip, was then tied.

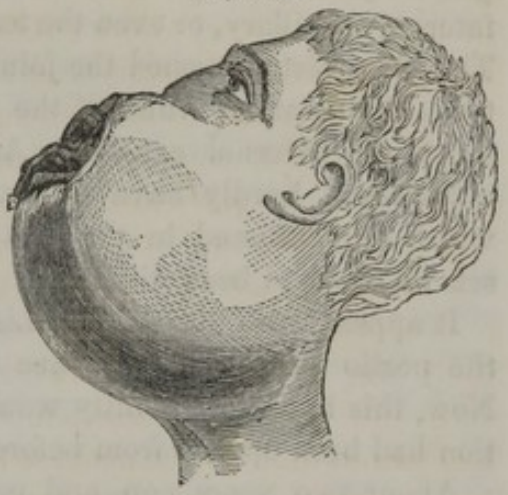
I next made a long semicircular incision from the left angle of the mouth, in the direction of the base and ramus of the jaw, and terminating over the condyle. Having secured the facial artery, and two transverse branches of the temporal, I dissected down the large flap thus formed quite to the neck, so as to let Dr. Ballingall feel the carotid lying in the muscular interspace, and ready to be compressed if there should be occasion. I then made another curved incision in a similar direction, commencing from the mouth, at such distance above the former as to include a portion of the cheek, which was firmly adherent to the tumor; and, having dissected up this flap, divided the masseter muscle, so as to expose the whole external surface of the tumor. The next step was to divide the mucous membrane of the mouth. This rendered the tumor much more movable, and enabled me to expose the coronoid process, divide the temporal muscle, and open the articulation at its fore part. I had then merely to cut closely round the condyle, and detach the pterygoid, mylohyoid, and other muscular connections.

The operation occupied twenty-four minutes; but all this time was not employed in cutting, as I frequently allowed a little respite, to prevent exhaustion from continued suffering. The patient bore it well, and did not lose more than seven or eight ounces of blood. His breathing was never in the slightest degree affected.

After placing a few folds of lint in the great cavity left by the tumor, which weighed four and a half pounds, I brought the integuments together on the left side of the face, in a triangular form, and retained the edges in contact by the twisted suture. The incision on the right side was dressed in the same way. Two or three turns of a roller were then put round the chin and head, so as to support the relaxed integuments.

The patient made no complaint of any sort after the operation. His pulse for the first two days was about one hundred, but soft, and gradually subsided to the natural standard. He slept well; had an appetite for his food—viz: beef-tea and whey, which were introduced into the pharynx through a funnel with curved tube; and performed his excretions regularly. The whole of the lint was removed by the third day, when the patient sat up, and declared that he felt better than he did previous to the operation.

Fig. 152.



In concluding this case, I may offer a few general remarks on the mode of operating.

The patient ought certainly to be seated, since the blood will thus be prevented from running into his throat, so as to delay the operation, or even render tracheotomy necessary to prevent suffocation.

There is no advantage in tying the carotid artery previous to commencing the extirpation. I was advised to do so in this case, but declined on the following grounds: 1. It is unnecessary, since the only arteries which must and ought to be cut are the facial, some of its branches, and some branches of the temporal. 2. It must exhaust the patient, especially when the tumor throws an obstacle in the way, as in Penman's case, where there was hardly any space left for applying a ligature. Thus, in one of Dr. Mott's cases, the patient was so much fatigued as to require the delay of a day after the artery was tied. 3. It increases the danger, since it cannot be denied that there is always more or less risk of hemorrhage on the separation of a ligature from so large a vessel as the carotid. 4. It is of no use, since the anastomotic communications are so free, that a ligature of the trunk is not sufficient to arrest the flow of blood from its branches. Thus, in Dr. Mott's case above mentioned, the arteries which were cut during the operation required to be tied; and I have heard of a case where the operator, attempting to remove a tumor of the upper jaw, tied *both* carotids, and was still obliged to desist by the bleeding. 5. Any good effect that

can be expected from *tying* the trunk, may be obtained by *compressing* it after the integuments lying over it have been dissected off, or divided.

The external surface of the tumor should be completely exposed before proceeding further, since all the vessels which ought to be tied may then be secured in the first instance, and a free drain is afforded to the blood which oozes from the small branches. The mucous membrane of the mouth being next cut, the tumor is rendered much more movable, and the surgeon will generally be able to free the coronoid process from its muscular connections. Should he fail in doing so, he ought to cut it across with the saw or pliers, and then, depressing the tumor as far as possible, open the articulation on its fore part; after which he has merely to carry his knife close to the tumor, and divide the remaining attachments.

I think Dr. Cusack is entitled to much praise for insisting on the propriety of opening the articulation from before, since a wound of the internal maxillary, or even the temporal, is otherwise almost inevitable. Thus Mr. Liston opened the joint from behind, and found it necessary to tie the common trunk of the temporal and internal maxillary—in short, the external carotid. And I think that the patient in this case would hardly have suffered the severe secondary hemorrhage which is mentioned in the relation referred to, if the superficial vessels merely had been divided.

It appears also that in Mr. Liston's case the ascending branches of the portio dura were cut, since the patient's eyelids were paralyzed. Now, this in all probability would not have happened if the articulation had been opened from before.

About two years ago, and consequently seventeen years after this operation, I was stopped in the street by a well-dressed, respectable-looking man, who introduced himself as "Penman." He told me that, after working for several years at home as a bootmaker, he had gone in quest of better wages to New York; that he had spent ten years in America, whence he had just arrived; and that he proposed to return there after a short visit to his native country. I was no less surprised than pleased to see how little the operation had injured either his appearance or articulation. Careful inspection, indeed, was requisite to enable an ordinary observer to detect anything peculiar in either of these respects.

[My colleague, Professor Bickley, informs me that he was well acquainted with Mr. Penman, who then resided in Petersburgh, Va., where he still followed his occupation of bootmaking; and, unless he has died within a short time, still resides there. The deformity is very much less than would have been expected. Never in any case did surgery perform a prouder feat than in this, when we consider that

at the time the operation was performed by Mr. Syme, chloroform was unknown, and that the tumor was one of the most extensive kind.—R. S. N.]

Since the date of Penman's case, I have operated many times, in a great variety of circumstances, for the removal of tumors originating in the lower jaw, nearly always with the effect of affording permanent relief to the patient. Of the very few cases that terminated unfavorably, two were those, in one of which the operation was most extensive, and in the other most limited. In the former I disarticulated the entire jaw, expanded into an enormous growth, by making an incision from ear to ear under the chin, without cutting through the lip. The operation was performed in the Royal Infirmary on the 1st November, 1843, with little more difficulty than usually attends the removal of one *ramus*, and the patient, a female twenty-five years of age, bore it so well, that the most favorable expectations were entertained of her recovery. Everything went on well until the evening of the following day, when her respiration suddenly became embarrassed, and she died before the cause of disturbance could be either discovered or remedied. I had some suspicion that displacement of the tongue was concerned in producing the effect, but could not obtain any satisfactory information upon the subject. Of the other case I have given the following account: *

[On the 30th of November, 1852, I was called to operate on the lower jaw of a Miss Moon, aged fourteen, who had osteo-sarcoma on the left side, which required removal of about two inches of the jaw bone. The patient being placed under the influence of chloroform, I cut down to and ligatured the submaxillary artery; I made an incision from the top of the lower lip down to the joint of the jaw—then back to the angle of the jaw. The integument was then dissected and thrown back. I then easily removed the affected portion of the bone with the saw. The usual dressings were applied and the parts healed rapidly. She soon recovered, and until the present time (May, 1857), she is quite well, with no prospect of a relapse.—R. S. N.]

About the middle of July, in passing through Dumfries, I was asked by Dr. Blacklock to see a lady who was suffering from a tumor of the face. She was between thirty and forty years of age, and had enjoyed good health until the preceding summer (1842), when her friends remarked that she had become thinner than before; and she noticed some uneasy feeling in the left side of her face. The jaw was impeded in its movements, twinges occasionally extended from the ear to the temple, and she experienced pain from resting her head on the affected cheek. In the month of December, as these symptoms had

* Monthly Journal of Medical Science, 1843.

not diminished, but rather increased, and become associated with a hard swelling in the situation of the parotid, the advice of a medical friend was requested in regard to her complaint, and the gland being naturally looked upon as the seat of it, leeches, followed by blisters, were repeatedly applied without producing any good effect. The pain, stiffness, and swelling had continued to increase with accelerating rapidity, so as at length to excite the apprehension of there being a growth from the bone.

On examination, I found that the swelling occupied the situation of that part of the parotid gland which lies over the ramus of the jaw. It presented a slight convexity or circular form, about an inch and a half in width, extending from the zygomatic arch downward, and backward to the mastoid process. The consistence was so firm, that it could not be distinguished from that of bone. The jaw could not be expanded, so as to separate the edges of the teeth, and when moved to the slight degree still permitted, seemed to carry the swelling with it. On putting my finger within the cheek, I felt that the tumor encroached considerably on the cavity of the mouth, but did not extend farther forward than the wisdom tooth. From the observations which have now been stated, together with the history of the case, concluding that the tumor in no respect, except the peculiarity of its seat, differed from those that of late years have so frequently been removed with success, by excision of the lower jaw, I advised the operation to be performed without delay; and, a few days afterward, the patient arrived in town for the purpose of undergoing it.

On the 25th of July, assisted by Mr. Goodsir, I made an incision from the zygomatic arch down along the posterior margin of the ramus, slightly curved, with its convexity toward the ear, to a little way beyond the base of the jaw. Having then dissected the parotid gland and masseter muscle off the surface of the jaw, I divided it immediately behind the wisdom tooth, by means of cutting-pliers, after notching it with a saw. As the ramus, upon this being done, did not as usual become more movable, I searched for the reason of its fixture, and found that the tumor had extended inward and backward, so as to rest upon the pterygoid and styloid processes, and completely lock the bone into its place. Having contemplated difficulty from this source, though not to the same extent, I had provided a strong pair of tooth forceps, with which the ramus was seized at its divided extremity, and forcibly drawn outward, while I divided its muscular connections, as they were successively brought within reach of the knife. In this way the tumor was detached, and turned out quite entire. It possessed the ordinary texture of fibro-cartilaginous growths proceeding from bone.

The operation was thus completed with wonderfully little disturbance of the face; there being no division of the facial artery, only

partial detachment of the masseter and internal pterygoid muscles, and no wound of the mucous membrane of the mouth. There was, consequently, none of the distress which, in the first instance, necessarily results from dividing the whole thickness of the cheek, such as discharge of blood and saliva, inability of speaking, and difficulty of deglutition. The jaw, which has been previously locked, was at once set free, and the patient not only spoke with perfect ease, but swallowed her food as if the jaw had not been concerned in the operation. She also experienced none of the secondary inconvenience which is apt to ensue from lateral displacement of the jaw, through inequality of the muscles acting upon it. There was no constitutional derangement, and the wound healed almost entirely by the first intention.

I am not acquainted with any other instance of the ramus of the jaw being disarticulated without opening the cavity of the mouth; and though the circumstances admitting of this operation must doubtless be very rare, I think it right to place the case that has been related on record, as evidence, that when a maxillary tumor is limited to the ramus, it may be removed on easier terms for the patient than have hitherto been deemed practicable.

Nothing could be more satisfactory than the condition and prospect of this case for some time after recovery from the operation. I regret to say, however, that, not many months subsequently, the glandular system became affected, and gave rise to a large swelling, which involved the bones of the face, and at length proved fatal.

The following case is deserving of mention on account of the great length of time during which the patient labored under a tendency to the disease, and the effect of repeated operations in ultimately relieving him from it.*

In the second volume of Mr. John Bell's Principles of Surgery, p. 180, a case is related of which some extracts will be sufficient to give an idea of its most important features.

"A young gentleman, Mr. H——, about twenty-five years of age, of an atheletic form and healthy constitution, and without the slightest taint of disease, hereditary or acquired, had, from no perceptible cause, a tumor, firm, cartilaginous, and elastic, seated so fairly in the center of the gums, as to raise the two center teeth of the lower jaw from their sockets far above the general range of the teeth, and separate the two that lay adjacent." "The tumor was about the size of a walnut, irregularly globular, knobby, and shining." "A tyro must have believed it to contain a fluid." "I was well aware that not a drop of fluid would follow a puncture, that the tumor inflaming, would turn out its edges, spread into a fungus, and in a few months cause a

* Edinburgh Medical and Surgical Journal.

horrible and melancholy death." "Dr. Monro, Mr. Allan, and myself having consulted on the nature of this tumor, declared it to be of a most dangerous nature." "We explained to our patient that it contained no fluid, was incapable of suppuration, was sure to become cancerous, admitted of no delay, and that we dared not do less than extirpate it from the very root." Mr. Bell describes the operation, and represents by drawings the appearance of the tumor, both before and after the operation. He used "a scalpel of special strength." "All my strength of hand was requisite to carry the knife down to the angle." "I cut with such decision, with such level lines, and made them so fairly meet with each other in the angle, that by pressing my two thumbs, one within side of the tumor, the other without, I pushed it out clear and unmangled."

"This gentleman is perfectly cured; the gums and adjacent teeth firm and sound; and I confess I could not reflect on the structure of this small tumor without saying within myself, What would have been the state of this tumor in three months? What would have been his state in six or eight? In its second stage, in little more than three months it must have filled the mouth with a fetid bleeding fungus! In eight or ten months it must have assumed the perfect character of incurable loathsome cancer!"

It is evident that Mr. Bell did not make the distinction that seems to be required between the medullary sarcomatous and cartilaginous growth of bone. If this tumor had been of the former kind the result of his operation would not have been so satisfactory, and he would probably have had to encounter the fungous excrescences he so impressively describes. As it was, the morbid disposition still remained, and, after lying long latent, at last showed proof of its existence. About twelve months ago, that is, twenty-two years after Mr. Bell's operation, this gentleman applied to me on account of a tumor, which so precisely resembled the one described by Mr. Bell in size, situation, appearance, and consistence, that the engraving in his work would have answered equally well for representing it, with the exception of the two front incisors being absent. He stated that the swelling had commenced some months previously, and was increasing. He had little or no pain, but a sort of uneasiness about the mouth, and numbness of the lip.

In consultation with Dr. Shortt and Mr. Nasmyth, it was resolved to cut out the tumor again, and this was accordingly done. It then appeared that the morbid formation descended into the interstices of the bone, and when, by means of the cutting-pliers and gouge, nearly the whole thickness of the jaw at the part concerned had been removed, the exposed surface still showed cells filled with the same unhealthy substance. It was now evidently the most prudent course to saw

through the bone on each side of the affected portion. But this proceeding was much more severe than the patient or his friends contemplated; and as the former operation, though not radical, had afforded so long an interval of freedom from visible disease, it did not seem warrantable, and therefore the actual cautery was applied very freely in its stead.

The wound healed kindly, and the cure seemed to be complete. At the end of two months, however, the patient observed that there was more than usual fullness under the tongue, and it soon afterward became obvious that the tumor was growing again along the whole extent of the jaw concerned in the former operation. The propriety of removing the affected part of the jaw was now strongly represented to the patient. He then consulted a person, who, for several weeks, made him believe that the external application of ointments would remove the swelling. Being at length awakened from this delusion by the decided opinions of Drs. Ross, Shortt, and Hunter, Sir George Ballingall, Mr. Nasmyth, and myself, he submitted to the operation, which was performed in the usual way. The jaw was divided on the right side, opposite the second bicuspid tooth, and on the left, immediately anterior to the last grinder; but as it appeared that, though the external part of the bone was sound here, a process of the cartilaginous growth extended into its center, another portion was taken away, so that nothing but the ramus was left on this side. The wound healed everywhere by the first intention—on the ninth day the patient shaved himself, and he has remained since perfectly well. Five months have now elapsed, and he seems to be safe from any relapse. He speaks with perfect distinctness, and is so little altered in appearance that no one would suspect anything unusual in the state of the mouth.

Had this tumor been left to itself, it would not probably have led to the frightful consequences anticipated by Mr. Bell, but rather have gone on increasing in size, like the similar growth which was removed from the young man Penman, after repeated ineffectual attempts had been made to excise it, and being ultimately allowed to grow until it weighed four pounds and a half.

CHAPTER XXVI.

NOSE.

EXTRACTION OF FOREIGN BODIES FROM THE NOSE.

Children frequently introduce small bodies, such as peas or cherry-stones, into the nostrils, where they are sometimes detained in consequence of the enlargement which they suffer, the swelling that takes place in the parietes of the cavity, or simply from their being pushed in with greater force than can be applied from within for their expulsion. The immediate inconvenience is seldom considerable, and the presence of the foreign body often escapes observation for a long while. Sooner or later a purulent discharge and ulceration are induced, and it may happen that surgical assistance is required on account of these symptoms months after the body has been introduced, and when its existence is not known, either from having never been discovered, or from having been completely forgotten. In all cases, therefore, of matter being discharged from one nostril of a child, the surgeon should search the cavity to ascertain if it contains any foreign substance. This is most effectually done by means of the forceps. They should be introduced with the branches fully expanded, and held in a vertical direction, parallel with the septum of the nose. From the flattened shape of the nostril they may thus be passed behind any body, however firmly impacted in it, and, after being fairly introduced, they should be closed so as to seize anything that may be present. One or two trials conducted in this way will enable the surgeon to satisfy himself whether or no there is a foreign body lodged in the cavity, and to extract it if detected. When the extraneous substance has been recently introduced, the process of removal should be performed in the same manner.

EPISTAXIS, OR BLEEDING FROM THE NOSE.

Hemorrhage from the nose frequently takes place, either commencing spontaneously, or being induced by the injury attending operations in which the parietes of the cavity are concerned. Spontaneous bleeding is generally suppressed by applying cold to the forehead, or introducing a piece of lint moistened with spirits or some astringent saline solution, into the nostrils. The same means usually prove sufficient when mechanical violence has been the exciting cause. But, in both cases, it occasionally happens that more efficient measures

are required; the blood, though prevented from flowing through the anterior openings of the nose, being observed to trickle down into the throat. It is then necessary to close the posterior nares also, by introducing a piece of sponge or lint. This may be done in various ways, and instruments have been contrived for the purpose; but the most convenient method is, to pass a probe or loop of wire, curved to the form of the palate, through the nose into the pharynx, and then draw it out of the mouth, conveying by its means a piece of strong ligature about a foot and a half in length. A compress of lint, large enough to obstruct the posterior opening of the nostril, is next tied securely to the middle of the thread which issues from the mouth. The other end being pulled, this plug is drawn backward, and with the assistance of the operator's left fore-finger, is lodged behind the soft palate, at the nasal orifice. The two ends of the thread are then secured; and when it is judged safe to remove the plug, the thread that lies in the mouth affords the ready means of doing so.

POLYPUS OF THE NOSE.

Tumors of several different kinds are met with in the nasal cavities; and though comprehended under the general denomination of polypus, must be carefully discriminated in regard to their prognosis and treatment. The most common of these growths possess a soft, but rather tough consistence, and yellowish-gray color; they bleed slightly when injured, and have not much sensibility; they often contain collections of limpid fluid, so as to constitute thin bags. These are named Simple Mucous, or Benign Polypi. They grow from the mucous membrane generally, where it covers the upper part of the nostrils, sometimes where it lies upon the inferior spongy bone, but never from the septum. They seldom exist singly, and are often met with in great numbers together. One nostril is very rarely affected alone. They occur at all periods of life, but are most frequent about middle age. They enlarge until the cavity is filled, and then remain stationary, rarely causing any expansion of the face by the pressure proceeding from their continued increase. The symptoms which they occasion are, obstruction of respiration, an uneasy sensation of stuffing of the head, dullness or total loss of smell and taste, and sometimes deafness. It is generally observed that these symptoms are most distinct in moist weather, and least so in an opposite state of the atmosphere.

The treatment of mucous polypus consists in removing the excrescences; and though various methods have been, and still are, occasionally employed for this purpose, there can be no doubt that the best mode of effecting it is evulsion by forceps. The instrument must be so small that its blades can be passed up along the sides of the polypus to its roots, where they should be fixed by strong compression of the

handles. The surgeon then, by a compound movement of pulling and turning, the latter of which should be steadily in one direction, endeavors to disengage the connections of the tumor. He may fail in the first or several subsequent attempts, but by careful and persevering efforts, guided by acquaintance with the shape of the cavity, he is sure of ultimately eradicating the disease. Except in those rare cases where the polypus is single, the patient can hardly be completely relieved by one operation; and the nostrils, though seemingly quite cleared, are again and again found more or less occupied by a similar excrescence. The cause of this is probably not so much reproduction as expansion of the polypous growth, and the repeated relapses, therefore, ought not to occasion discouragement. Astringent washes and caustic are sometimes employed to repress the tendency to new formation, but there is strong reason to believe that the good effects obtained in this way are very inconsiderable, and it would be improper to confide in them so far as to withhold the use of the forceps, so long as any vestige of the disease can be discovered to exist. When the polypus grows from the lining membrane of the inferior spongy bone, which is most apt to be the case in children, it may be easily removed by introducing a pair of curved scissors along the edge of the bone, and thus either completely detaching the tumor, or so weakening its connections, as to facilitate its subsequent evulsion by the forceps. It is necessary to beware of mistaking for this disease a mere thickening of the mucous membrane, which is common in children, or a projection of the septum to one side, which exists to a slight degree in most people, and not unfrequently encroaches so much on the nostrils as to occasion serious inconvenience.

The next kind of polypous growth from the nasal cavities that may be mentioned is of variable consistence, from the softness of brain to the firmness of glandular tissue, but is always extremely friable in its structure, so as to tear easily, and when subjected to extension, gives way at the part where the force is applied. It bleeds profusely when injured; tends to increase without any limitation, making room for its accommodation by expanding and separating the bones of the face; and is found to originate from the osseous substance of the parietes of the cavity. This medullary, bleeding, or malignant polypus, as it is named, usually occurs at the middle and later periods of life. It is distinguished by the characters which have been mentioned, and by being attended with pain, and bloody or purulent fetid discharge. The rapidity of its progress is very variable, but its result is always unfavorable.

The radical removal of this disease is impracticable, and when the morbid disposition is very active, or when the disposition to bleed is great, any attempts to delay its progress by extracting as much of the

mass as can be reached are hardly prudent, being more likely to accelerate than prolong the patient's fate. In cases of a milder description, advantage seems often to be derived from clearing the nostrils occasionally, which is easily accomplished, and relieves the patient from time to time. The operation cannot be performed well with forceps alone, as the want of cohesion in the morbid structure prevents them from removing any more of the mass than what is actually embraced between their blades. Knives, scissors, and hooks are employed, but the best instrument for the purpose is a finger, which being introduced into the expanded nostrils, feels where the polypus is attached, and forces it away from the bone. The cavity having been thus emptied, is stuffed with lint to stop the bleeding, and caustic or astringent lotions may be afterward applied.

The third and last kind of polypus that requires to be noticed, is remarkably distinguished by the extreme firmness of its texture, which nearly equals tendon in strength. It is distinctly fibrous, and has hence been named the Fibrous Polypus. It bleeds profusely when injured, increases without any limit, descending into the pharynx, and proceeding beyond the external orifice of the nose, and ultimately proves fatal by causing hemorrhage, suffocation, or pressure on the brain. It almost always exists singly, and occurs chiefly in young adults of the male sex. M. Dupuytren, who first remarked the peculiarities of this fibrous structure, supposes that it frequently exists as an antecedent of the medullary or brain-like polypus, into which it degenerates, first at the part most distant from its root, and ultimately throughout its whole extent. It may be stated, however, on the evidence of extensive observation, that the soft kind of growth often (so far as I have seen, always) displays its proper characters from the commencement; and there are cases on record in which the fibrous polypus retained its distinctive firmness of texture after existing for years, and attaining a great size. It seems to adhere to the bone, but not to depend on any diseased condition of that tissue, so that if torn out by the root, it may be permanently removed. This method has been recommended by Dupuytren as the only mode of effectual treatment; and in order to obtain a secure hold for the instruments, he did not scruple to slit open the nose. Sometimes it distends the *antrum maxillare;* and having caused absorption of the walls of the cavity, protrudes under the cheeks, where it may be exposed by dividing the mucous membrane of the mouth, and seized with forceps. The instruments for this purpose should be very strong, and provided with numerous large projecting teeth. Several pairs, in general, are required to be fixed in succession as space is gained; and the strength of two or more stout assistants has been found necessary to effect the

evulsion.* In performing such operations, the surgeon should be prepared for a profuse hemorrhage; and, as a precautionary measure, ought to pass a thread for plugging the posterior opening of the nostril, if this should prove necessary.

Polypous growths of different kinds sometimes, instead of growing forward into the nose, descend into the pharynx. In such cases, the principal part of the tumor may, in general, be removed by introducing the loop of a doubled silver wire through the nose into the pharynx, guiding it with the finger round the body of the growth, and then pulling the wire so as to draw it up to the neck or thin part near the root. The ends being then passed through a double canula, are fastened to its extremity, and tightened every day until the instrument is detached, when the polypus either falls into the pharynx, or may be easily extracted by fixing a hook into it. But it is better to detach the polypus by seizing its roots with forceps introduced through the nostril, and then to push it into the throat.

[Experience has convinced me that the study of tumors occasionally found in the nasal cavities, and of which there are a great variety, has been too much neglected by surgeons. As I conceive it to be the duty of every surgeon to freely express his opinions to the profession, I propose in this paper to discuss the subject of nasal polypi. There are many kinds of tumors met with in the nose, some of which ought not to be included under the title polypus; yet, no doubt, many of these imperfectly developed polypi degenerate into true polypi, and others again of the cancroid kind, have originated from ordinary polypus, or some of its varieties. There have been a variety of divisions of nasal polypi, yet none seem to be perfectly satisfactory. It will serve the purposes of surgery to regard them either as simple mucous, fibrous, or cancerous. Of each of these kinds there are many varieties. The mucous tissue of the nasal cavity, like that of the uterus, is studded with small glands, and as both those cavities are exceedingly subject to polypus, it is fair to infer that they generally originate from some diseased condition of those glands. What that exact condition of disease is, would be difficult to determine, as we have no means of examining the mucous surfaces of the nasal fossa and the uterus before disease has brought the patient to our hands. Examination then instituted, can lead to no important conclusions, for the parts are already in an advanced pathological condition. It is a well known fact, that while the mucous membranes are a continuous structure, it differs very materially in different localities, and this circumstance explains the fact that tumors arising from it, in different localities, also differ very much in character. M. Nelaton has recognized this fact,

* Sabatier, Medecine Operatoire, par Sanson et Begin, 1824, T. iii, p. 280.

and has pointed out the circumstance that both the membranes of the nasal fossa and the uterus are subject to hemorrhagic disease—indeed both are subject to hemorrhages which are not regarded as being of a diseased character.

The membranes of the nasal fossa are subject to quite a number of diseased conditions, which are not true polypi. There may be a mere thickening of the parts, there may be open ulcer, there may be intense inflammation; but the diseases common to that locality are mostly of the polypous character. Wherever we detect a single polypus of the cavity, we shall find upon examination that it springs (if of the simple mucous kind) from the mucous membrane, and will soon be followed by similar growths. Very often we notice, in post mortem examinations, a great number of minute polypi, when only one is developed to any considerable size. They are not confined to any particular period of life, but are most common in the middle period. We often observe a defect in the voice, some persons articulating particular sounds with great indistinctness. Upon close inspection we shall find the tissues of the nasal fossa to be affected with polypous disease, though there may be only a thickening of the tissues. Mucous polypi usually grow rapidly until the cavity is filled up, when they remain stationary, rarely causing any material deformity, as is the case with the enlarged fibrous tumor. They not unfrequently entirely destroy the powers of olfaction and in some instances also the function of audition. The taste, too, is always dull in persons thus affected. We are not, however, to infer that a loss of those senses presupposes, of necessity, the existence of polypus. It is further to be remarked, as Mr. Syme intimates, that these symptoms are aggravated to a considerable extent in damp weather. In children the polypus generally grows from the lining membrane of the inferior spongy bone. Upon examination, such polypi are found to be composed mainly of grayish vesicles inclosed in a soft cellular tissue. Malgaigne tells us that these polypi usually spring from the superior and middle spongy bones, near the maxillary sinus. My experience has shown that they may spring from the mucous membrane of any part of the cavity, unless we except the middle septum of the nasal fossa.

Before any remedial means are adopted, we should be sure that what we are regarding as a mere mucous polypus is not, in reality, only a thickening, or tumefaction of the mucous membrane. This, in children, is very apt to be the case. Extorsion may relieve for the time, but the polypus will return, and the only effectual remedy is a general alterative and tonic course of medicines, and, after mild cauterization of the parts, the application of such tonic astringents as will give tone and vigor to the membrane thus affected. There is but little doubt in my mind, that all forms of polypus of the nose, are mere degenerations

from the simple mucous polypus. Different surgeons have adopted different plans both for extorting and for excising nasal polypi, almost any of which are usually quite successful, and the local application of proper caustics and tonic astringents, is considered by me to be of more importance than the mere removal of the developed polypus, since it should be our object to prevent, if possible, their recurrence, which would thus subject the patient to renewed operations. For purposes of cauterization, some of the forms of zinc are preferable. Either the sulphate or chloride answers well.

The fibrous and cancroid varieties should be considered as varieties of one and the same tumor, as there is but little doubt that the latter is merely a degeneration of the former. It may rise from any part of the cavity, but springs generally from the submucous tissue, and sends its roots in all directions, especially into the natural cavities. In its fibrous state it is very solid, and tough, indeed, as has been remarked, its strength may be nearly equal to tendon; hence the difficulty of removing it by torsion. Patients thus affected are generally the victims of much unnecessary pain, in the hands of men who regard all polypi as mere fungi to be easily removed with the forceps. When in the true fibrous state, these polypi are usually well supplied with blood-vessels, and hence excision is often attended with profuse hemorrhage. Fibrous polypi often attain a large size, and speedily prove fatal unless prevented by an operation. They create great deformity, separating bones, breaking down structures, displacing the eye, and committing great ravages generally. They may produce dissolution by hemorrhage, by pressure on the brain, or by suffocation, as they not unfrequently descend into the pharynx and fill up the orifice.

Young persons of the male sex are most liable to this disease, it being rarely met with after forty-five years have been attained. Indeed, in the extensive experience which I have had, I have not met with a single case in a patient over forty. Nothing short of an operation can effect a radical cure, and even this is not always successful. There may be present an incipient cancroid condition, which, if not promptly met, will soon develop into open cancer. Hence I deem it proper for the surgeon to constantly bear in mind the great liability of this tumor to degenerate into the cancroid variety. He will thus treat it rationally; he will vary his plan as the indications are more or less perfect of such a cancroid tendency, and indeed it would be well to regard such a condition to be present in all cases of true fibrous polypus. I proceed to a case which illustrates the treatment of both the fibrous and the cancerous stages of nasal polypi, premising that I regard the case as one worthy of record.

In 1855, C., aged about thirty years, presented himself at Newton's Clinic for treatment of a cancerous tumor of the nasal fossa. In

appearance, this man's general health was materially affected by the local disease under which he was then laboring, and had been for months. He stated that its ravages were beginning to affect his general health, though not so much as to lead him to anticipate particular danger. The left eye was considerably protruded, the nostril of the left side was not only completely filled, as was the right, but very much enlarged. The voice was exceedingly defective, and there was escaping an intolerable odor which had recently began to keep the patient nauseated. Upon examination it was found that the entire cavity was filled with a cancroid polypus, which had filled the entire surrounding space, and displaced the soft palate, absorbed the greater part of the bony roof, which it had broken down, leaving the tumor suspended into the mouth, and resting on the tongue, making it impossible for the patient to breath unless the mouth was opened, and very difficult to introduce his food. Upon close inspection I supposed it to be attached to the basilar processes underlying the skull, with roots diverging into all the cavities, deeply seated in the submucous tissues, and in many places adhering to the bony surface of the basilar processes. The posterior part of the tumor was, no doubt, attached to the vertebral column, though of this there is some doubt in my mind, notwithstanding those parts were eventually reached. I am disposed to think that attachment to this point is not usually extensive, and from the clasping nature of the base of these tumors we are liable to be mistaken as to the true points of origination. A prolongation of the tumor had entered the cranium and compressed the optic nerve, thus destroying the impressibility of the iris to the influence of light. Whether the entrance had been effected at more than one point cannot be stated. Another prolongation had found its way into the zygomatic fossa through the ganglion of Meckel; in fact, it had penetrated every opening in the vicinity. The patient had the hemorrhagic diathesis, bleeding profusely on slight wounds being sustained, so that I deemed the ligature preferable to the knife for extirpation. This was passed up through the nostril with the spring canula, around the posterior base of the polypus, and out again at the nasal orifice. By close attention for a couple of weeks the tumor was so nearly removed that it was excised, and the chloride of zinc and hydrastin, mixed to the consistence of paste applied. The patient now found himself able to breathe freely, and being relieved from the disagreeable odor, he was generally more comfortable. I should have operated by removing the superior maxillary bone, preserving the membranes, as far as possible; but the disease had made such frightful progress that the roof of the mouth was destroyed, membranes included, to a considerable extent, so that there was no necessity for enlarging the orifice. Upon removal the tumor exhibited both the fibrous and encephaloidal cancerous

peculiarities, large portions being decidedly of a medullary character. The discharging purulent matter was insufferably fetid, and irritating to the healthy parts with which it came in contact. The treatment was long and tedious, requiring patience in both the surgeon and patient. Several months' constant attention, however, enabled me to destroy every vestige of the tumor. The periosteum and the Schneiderian membrane were both too much destroyed to allow me to entertain hopes of the regeneration of the bony roof, but at the end of eight months, the cavity was covered over, the voice improved, and the parts looking sound. The eye regained its function and receded into its normal position, and the patient was finally discharged cured, his general health having improved in every particular, and the hemorrhagic tendency having been removed. The surgeon will find great care in the application of his caustics will be requisite; injudiciously applied, it may produce fatal consequences; and I beg also to caution the inexperienced operator against the danger of hemorrhage. To this circumstance of a disposition to excessive hemorrhage may be added the liability of the patient to sink under the operation, unless the system has been previously toned up to resist the reverted secretion which must occur after the removal of the tumor.

A variety of tumors of the nasal fossa and the surrounding parts may degenerate into cancer, but I am convinced that those of a polypous kind are more liable to such degeneration. It may be laid down as a rule, then, that nasal polypi should be removed as soon as possible, no matter what may be their character, as delay may be fatal, or may subject the patient to a dangerous operation, when a simple one would have been all sufficient in the outset.

Mrs. R. E.——, Iowa, aged fifty-seven. Father's brother died of consumption. When young, had black hair, blue eyes and pale skin, also full chested—now her hair is white and her system much debilitated. She is of a very mild and pliable disposition.

In the winter of 1851, exposure to cold induced catarrhal symptoms, and in April, 1852, she observed a tumor forming in the right anterior nares, which continued to increase until it completely obstructed the nostril. Dr. P., of Iowa, applied caustics, but they only irritated it, causing a discharge of sanious pus.

May 23d. 1853. She presented herself for treatment. The tumor at this time had increased to an alarming extent presenting the appearance of a broad-based, malignant polypus. It filled up the entire right nostril, protruded anteriorly—attached also to the floor of the the nose, the edge of the nasal process of the superior maxillary, the surface of the ossa palati, and protruding into the throat, pressing against the velum pendulum palati. The nose presented a singularly hideous and deformed appearance, looking like a tumor upon the face.

The right nasal bone was entirely absorbed by the pressure, and the tumor had passed out under the skin of the face near the nose and extended into and to the bottom of the orbit, pressing the eye outward and toward the external canthus, giving the patient a horrible appearance. She insisted upon having an operation performed. Dr. Darling administered chloroform, and when perfect anæsthesia was produced she was operated upon by Prof. Freeman, and O. E. Newton, M. D. Bellocs' canula for plugging the nostril was crowded through the anterior edge of the tumor partly between it and the roof of the nares, and a piece of sponge was attached and retained at the posterior nares by a string to prevent the blood from passing into the throat and suffocating the patient. The incision was then commenced at the tip of the nose on the right side of the mesial line and carried up to the internal angular process of the os frontis and outward, surrounding that part of the tumor located within the orbit. The right side of the nose was then dissected over, exposing the whole of the nasal process of the superior maxillary, and the tumor dissected from the surface and bottom of the orbit, and from three-quarters of an inch of the surface of the sclerotic coat of the eye, entirely removing the internal rectus muscle. The whole of the tumor was then removed from its attachment to the floor and side of the nares and soft palate, exposing an extensive bleeding surface. They then applied pulv. zinc sulph. 3ss to the part, which checked the hemorrhage and destroyed the fragments of morbid tissue that might have escaped the knife. The incised edges of the nose were placed in apposition, and retained by sutures and adhesive straps—it healed by first intention. The wound within the socket was dressed with cold water.

June 6th, a painful tumor presented itself upon the side of the neck, under the right ear, which increased to about three inches in diameter and four in length. This suppurated and ruptured spontaneously. June 9th, inflammation of the ball of the eye supervened. June 10th, the right tonsil and velum pendulum palati were much swollen and inflamed, producing great difficulty in deglutition.

June 12th, ulceration of the cornea, which resisted topical applications. June 19th, removed the chrystalline lens in a diorganized condition. June 22d, fungous tumor appeared at the internal canthus of the right eye—applied pulv. zinc sulph. 3j, Mayer's oint. 3 ij, M. The inflammation induced was reduced with Mayer's oint., alternated with poultices of ulmus fulva. July 12th, inflammation of the eye subsided. July 17th, hepatitis presented itself. July 19th, relieved. Frequent attacks of diarrhea occurred, which were relieved by the usual treatment. Aug. 1st, discharged cured.*—R. S. N.]

* Eclectic Medical Journal, page 341, 1853.

ULCERS AND OTHER DISEASES OF THE ALÆ OF THE NOSE.

It has already been observed that warty excrescences on the face are apt to degenerate into malignant sores in the advanced period of life. When cancers, originating from this or other sources, are seated over the cartilages of the nose, it is prudent to cut away a portion of the whole thickness of the parietes, as the disease can hardly be extirpated otherwise, and ineffectual attempts would probably promote the diseased process. If this operation is performed early, the cut edges may be brought together and united so as to leave no preceptible deformity.

The skin on the nose is liable to an over-growth, which at first makes it present a warty or tuberculated appearance, but when more advanced, completely alters its shape, and constitutes large irregular pendulous masses, which occasion great deformity and inconvenience. In cases of this kind, that are so aggravated as to warrant an operation, the redundant substance may be shaved off, while the surgeon, by keeping his finger in the nostril, ascertains the extent to which he should cut. Cold applications restrain the bleeding; and when cicatrization is completed, wonderfully little trace of the disease remains. It may afterward return and require similar treatment, but the operation is seldom necessary more than once.

Lupus, or *noli me tangere*, is an obstinate ulceration of the nose or adjacent parts, always superficial in the first instance, and generally continuing so, but sometimes extending more deeply and causing extensive destruction of the face. It presents various appearances, but in general has the character of healing at one part while it extends at another. The ulcer is usually covered with a scab, and surrounded with inflamed skin. The disease, though left to itself, sooner or later suffers a spontaneous cure, but seldom until great deformity is occasioned by its ravages. It occurs chiefly in youth, and affects females more frequently than males.

The treatment of this affection is very unsatisfactory, since the mode employed often proves unavailing, or procures merely a temporary amendment. The general health, if deranged, ought to be restored if possible by an appropriate course of alterative medicine and diet; but it is on local applications that the principal reliance is usually placed. Of these, different preparations of arsenic are regarded as the most efficient. A solution of the white oxide, in the proportion of five or six grains to the ounce, or Fowler's solution, or a mixture of the white oxide with calomel, or an ointment containing the white oxide with sulphur, in the proportion of a drachm of each to the ounce. The nitrate of silver, applied either in substance or strong solution, is sometimes employed. The black-wash, and other metallic solutions, are also occasionally useful.

RESTORATION OF THE NOSE.

The nose may be defective as a fault of original formation, or from the effects of violence, or in consequence of ulceration. The want of this feature not only causes a most disagreeable deformity, but impairs the sense of smell, and exposes the patient to annoyance from the entrance of foreign matters into the nostrils. Ingenious practitioners have endeavored to construct a substitute for the lost part, by attaching in its place a flap of skin taken from some other part of the body. There are two methods that have been chiefly followed in doing this, which are named the Italian, and Indian. The former was contrived and practiced by Taliacotius. It consisted in dissecting from the arm a flap of skin, uniting one of its edges to the face, while the other remained attached to the arm, and after the union was completed, separating the piece of skin entirely from the arm, fashioning it properly for representing the nose, and completing its union with the face. This operation seems to have been repeatedly performed by Taliacotius, and some of his cotemporaries, but has not been adopted in modern surgery. The Indian method is simpler, and better calculated to attain the object in view. It is executed by dissecting from the forehead a flap of skin sufficient for constructing the absent feature. The size and shape requisite for this purpose having been determined by fitting a piece of card or wax into its place, and then expanding this upon the forehead, where its extent is defined by marking the skin round it with ink, the flap is detached, with the exception of a narrow slip at its lower part, which is left to supply it with nourishment, and its edges are connected by stitches to raw surfaces formed where they are required on the face. Tubes are inserted into the nostrils to permit respiration, and a sufficient quantity of lint is introduced to give them the requisite shape. Cloths wet with cold water are then applied to moderate the subsequent action, and promote union by the first intention. This operation which seems to be of very ancient origin, was first adopted in this country by Mr. Carpue.* It has since been frequently practiced both at home and abroad, and often with results highly creditable to the dexterity of the operators. But though noses may thus be formed which would not attract attention at a distance, and appear tolerably well in a drawing, where the disparity of color, surface, and other characters, are not expressed, it must be admitted, that the substitute is almost always even more disagreeable than the dificiency; and there is good reason for regarding such achievements as more curious than useful, especially as by

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* Carpue. Account of Two Successful Operations for the Restoration of a Lost Nose. 1816

the means of enamel or other suitable compositions, imitations of the lost part may be constructed, which prove more seemly, and much less uncomfortable to the patient.

[Preparations of zinc should be used in place of the arsenic and mercury.—R. S. N.]

CHAPTER XXVII.

THE EAR.

FOREIGN BODIES IN THE EAR.

Children are very apt to introduce peas and other small bodies into the ear, and attempts to remove them with forceps of the usual construction tend to press them inward. A slightly curved steel probe is the most convenient instrument for the purpose. It has happened that the extraneous substance, by swelling after its introduction, or by being very forcibly inserted, resisted the most careful efforts at removal in this way, and it has become necessary to make an incision into the tube of the ear at its posterior side, so as to permit the introduction of a hook or probe for effecting the dislodgement. Such a proceeding can be very rarely necessary, and the surgeon should beware of having recourse to it in cases where he cannot detect the foreign body by external examination, and is led to believe in its presence merely by the relation of the patient's friends, as an erroneous impression of this kind is frequently produced by disagreeable feelings in the ear, remaining after the removal of some irritating substance.

The ceruminous secretion of the ear frequently accumulates in undue quantity, and occasions deafness more or less complete. When this is discovered by inspection of the cavity in a bright light, a little oil should be introduced to soften the mass, after which repeated injections of warm water are to be thrown in to wash out the wax. The patient should afterward avoid exposure to cold, and take measures to prevent the same thing from happening again.

A preternaturally dry state of the meatus and membrane of the tympanum, depending upon a deficient secretion of wax, also impairs the sense of hearing, and benefit in such circumstances is often derived from anointing the surface with some stimulating ointment, as a mixture of axunge with a small proportion of oil of cloves, or any other of a similar kind.

INFLAMMATION AND SUPPURATION OF THE EAR.

Inflammation of the ear is generally induced by exposure to cold. It is attended with pain, more or less acute, and either confined to the ear, or extending through the head. Pressure or motion of the auricle increases the patient's distress, and there is constitutional disturbance in proportion to the severity of the local complaint. The attack terminates in resolution or suppuration, the matter in the latter case being effused, either exteriorly to the membrane of the tympanum, or within it, so as to cause pressure and absorption, for obtaining vent to escape. In the former case, there is merely a running, which admits of cure without loss of hearing; but in the latter, there is apt to be caries of the temporal bone, and a permanent discharge, with partial or complete deafness.

The treatment of the inflammatory state requires bleeding, cathartics, warm fomentations, and the antiphlogistic regimen. The chronic discharge of matter demands the injection of metallic washes, and blistering on the back of the neck. And when the bones are affected, the same means may be employed, but with an unfavorable prognosis. Recovery from this state sometimes occurs; but more frequently the disease proves obstinate, and occasionally fatal, by leading to a morbid condition of the brain, particularly the formation of abscesses in its substance. [Omit bleeding and blistering.—R. S. N.]

POLYPUS OF THE EAR.

Polypous excrescences are occasionally met with growing from the cavity of the ear, and protruding either through the external aperture, or an opening caused by absorption in the posterior wall of the canal. They usually possess a florid color, and vascular structure. They are attended with a thin muco-purulent discharge, and seem to agree in their nature with the growths which spring from the lining membrane of the prepuce and the conjunctiva, in consequence of inflammation terminating in suppuration. The best mode of treating them is to pull away with forceps as much as possible of their substance, and then touch the remaining surface with nitrate of silver, afterward using the injections of sulphate of zinc, or other metallic solutions, to correct the morbid action of the membranes.

OBSTRUCTION OF THE EUSTACHIAN TUBE, AND PERFORATION OF THE MEMBRANE OF THE TYMPANUM.

The Eustachian tube is liable to be obstructed at its pharyngeal extremity by a variety of circumstances, of which the most deserving of notice are thickening and adhesion of its lining membrane, consequent on inflammation of the throat, enlargement of the tonsils, and nasal

polypus. It has been already mentioned in regard to the last two of these affections, that they occasionally give rise to deafness in this way, which is relieved by their removal. But when the tube is closed, the only method of restoring the patient's hearing is to remove the obstruction, by introducing probes or injections through the nose into the contracted or obliterated tube. This operation is so extremely difficult and uncertain, that it cannot be regarded as affording any real advantage; and it has, therefore, been proposed, in such cases, to make an opening in the membrane of the tympanum, so as to place it in equilibrium as to the pressure of the atmosphere, on its internal as well as external surface. Numerous attempts have been made with this view, and frequently with temporary benefit. The return of deafness, which the patient has almost always suffered, has been ascribed to closure of the aperture, and various modes of making it have been proposed, in order to prevent the edges of the wound from uniting. It is probable, however, that the relapse depends on other circumstances, as it is not easy to conceive how the edges of such wounds could unite, except as a rare accident, and since the deafness has returned, even after a part of the membrane was actually removed.

STATISTICS OF OVARIOTOMY.

GEORGE LYMAN, M. D., Boston, has examined all accessible records for facts and data, from which he has compiled a table of three hundred cases of operations for the removal of diseased ovaria, in which all the important concomitant circumstances are carefully tabulated, together with the complications which occurred in the different cases, and the remarks which were suggested therefrom.

From the facts which he records, he makes the following deductions:

1. The mortality attendant upon ovariotomy is no greater than it is after other capital operations.

2. The mortality resulting from extensive incisions of the peritoneum is generally over-estimated.

3. Fully developed cystic disease of the Ovarium tends rapidly to a fatal result.

4. No method of treatment heretofore devised for it is so successful as extirpation ; excepting, possibly, that by injection with iodine, of the results from which, we have, as yet, insufficient statistics.

5. The operation is unjustifiable in the early stages of the disease.

APPENDIX.

As I HAVE referred to several concentrated medicines in the body of this work not found in the Dispensatory, I insert the following list for the benefit of the reader, as furnished by a friend; all of which medicines are now extensively used, and for sale in the drug market.

POWDERS.

AMPELOPSIN.

Derived from the *Ampelopsis Quinquefolia*. (Common names—American Ivy, Woodbine, Five Leaf, etc.)

Properties and uses—Alterative, tonic, astringent, and expectorant.

Used in the treatment of venereal diseases, scrofula, dermoid affections, bronchitis, and other derangements of the respiratory system, and in all cases in which an alterative is required.

Dose—Two to four grains.

ALNUIN.

Obtained from the *Alnus Serrulata*. (Common names — Tag Alder, Swamp Alder, etc.)

Properties—Alterative and tonic.

Used in strumous and cutaneous affections, syphilis, and in all cases attended with debility and vitiation of the blood and fluids. From twenty years' experience in the use of this article, both in crude and concentrated forms, we have learned to value it highly.

Dose—One to two grains.

APOCYNIN.

Obtained from the root of the *Apocynum Androsæmifolium*. (Common names—Dog's Bane, Bitter Root, etc.)

Properties —Alterative, tonic, aperient, diuretic, detergent, deobstruent, emetic, diaphoretic, and anthelmintic.

Used in dropsy, dyspepsia, scrofula, rheumatism, consumption, atonic conditions of the stomach, kidneys, and lacteal vessels, and in the convalescing stage of typhoid and other fevers, dysentery, and other forms of acute disease; also, for destroying the ascaris vermicularis.

Dose—One to two grains, three or four times per day.

ASCLEPIN.

Obtained from the rhizoma of the *Asclepias Tuberosa*. (Common names—White Root, Pleurisy Root, etc.)

Properties — Diaphoretic, diuretic, antispasmodic, carminative, expectorant, resolvent, sub-tonic, and laxative.

Used in pleurisy, pneumonia, fevers of different types, rheumatism, peritonitis, catarrh, consumption, indigestion, flatulence, hysteria, hooping-cough, asthma, hepatic derangements, chronic rheumatism, diarrhea, dysentery, and to promote the eruption in exanthematous fevers; exercises an especial influence over the serous tissues—hence is of great value in the treatment of diseases involving those membranes; gives prompt relief in flatulent colic. Its powers are enhanced by being administered in warm water. In dysentery, during the febrile stage, it is of great value.

Dose—Two to four grains.

BAPTISIN.

Derived from the root of the *Baptisia Tinctoria*. (Common names — Wild Indigo, Horsefly Weed, etc.)

Properties and uses—Astringent, emetic, emmenagogue, purgative, stimulant, and antiseptic; also esteemed by some as a febrifuge, and diaphoretic. Internally, this remedy is principally used in those cases of scarlet, typhoid, typhus, and other fevers wherein symptoms of a tendency to putrescency present. In such cases, this remedy, as an antiseptic, stands unrivaled.

It has also been used with very satisfactory results in some forms of rheumatism and pneumonia. It is unsafe to use during the period of utero-gestation, as it is capable of producing abortion. It excites the glandular system powerfully, which entitles it to the appellation of resolvent.

Externally, it is a valuable remedy for all kinds of ulcers, even the foulest, either gangrenous, eating, or syphilitic; also for ulcerated sore throat, mercurial sore mouth, sore nipples, chronic sore eyes, and, in short, every ulcerous affection. It may be sprinkled upon the surface of the sore, made into an ointment, or into a poultice with elm bark.

Dose—One to three grains.

CAULOPHYLLIN.

Obtained from the rhizoma of the *Caulophyllum Thalictroides*. (Common names—Blue Cohosh, Blueberry, etc.)

Properties—Antispasmodic, diuretic, diaphoretic, alterative, emmenagogue, anthelmintic, parturient, and tonic.

Used in rheumatism, dropsy, epilepsy, hysteria, cramps, amenorrhea, dysmenorrhea, chorea, leucorrhea, hysteritis, hiccough, to expedite delivery, and to relieve after-pains. For this last purpose, particularly when combined with Cypripedin and Scutellarin, it is very efficient. As a preparatory parturient, given in moderate doses every night at bedtime for several weeks previous to confinement, it allays cramps, false pains, and other unpleasant symptoms. In atonic conditions of the uterus, passive hemorrhage, congestive dysmenorrhea, and prolapsus uteri, it has proved of much efficacy. To expedite delivery in cases of debility, fatigue, or want of uterine energy, it is superior to ergot. The doses in these cases are to be repeated every thirty or sixty minutes.

Dose—As an alterative, one to three grains; for other purposes, two to five grains.

CERASEIN.

Derived from the bark of the *Cerasus Virginiana*. (Common name—Choke Cherry).

Properties and uses—Cerasein is astringent, tonic, nervine, antispasmodic, diuretic, antiperiodic, and febrifuge. In the treatment of ague and fever, according to the experience of many practitioners, it is unequaled. It is alike applicable in the treatment of fevers of every type, and the convalescing stages of all acute diseases.

Also chorea, hysteria, spermatorrhea, and in all cases where an antiperiodic, tonic, and febrifuge is indicated.

Medium dose—Five grains.

CHELONIN.

Obtained from the *Chelone Glabra*. (Common names—Snakehead, Balmony, etc.)

Properties—Tonic and vermifuge.

Used in indigestion, debility, hepatic derangements, loss of appetite, and for the removal of worms.

Dose—One to two grains.

CORNIN.

Obtained from the *Cornus Florida*. (Common name—Dogwood.)

Properties—Tonic, astringent, and slightly stimulant.

Used chiefly as a substitute for quinine where a peculiar idiosyncrasy forbids the use of the latter article. It is considered the best native substitute for the bark that we have. But it possesses other properties not less valuable than its antiperiodic power. In that distressing symptom of indigestion termed heartburn, it gives prompt relief. It has also gained considerable reputation in the cure of leucorrhea.

Dose—Two to four grains.

CORYDALIN.

Derived from the root of *Corydalis Formosa*. (Common names—Turkey Corn, Turkey Pea, Staggerweed, etc.)

Properties and uses—Alterative, tonic, and diuretic. This remedy is esteemed one of the most valuable of its class, particularly in the treatment of syphilis, scrofula, and dermoid diseases. As an alterative, its operation is prompt and positive; as a tonic, it fulfills the indications for which the pure bitters are employed. Its operation is silent, safe, and salutary.

Dose—One to two grains.

CYPRIPEDIN.

Prepared from the rhizoma of the *Cypripedium Pubescens*. (Common names—Ladies' Slipper, Nerve Root, etc.)

Properties and uses—Antispasmodic, nervine, tonic, and slightly narcotic. There probably never will be an article discovered which will meet so many indications in the treatment of disease, where an antineuropathic is needed, as the different preparations of opium. Its praises have been long and well sung, and we would not detract one iota from its just merits. There are many cases of idiosyncrasy, etc., where opium does not act kindly. In these cases, and as a general nervine, the Cypripedin is very beneficially used. Those cases of hysteria, chorea, nervous headache, neuralgia, hypochondriasis, etc., which are aggravated, or not relieved, by opium, this article is used with very happy results. It is also beneficially used in all cases of nervous irritability, nervous headache, and is far preferable to administer to children than any of the preparations of opium. There is no danger of its producing constipation, and its tonic property renders it very serviceable in diseases of debility. It may be used in all cases where it is desirable to quiet the nervous system.

Dose—Two to four grains.

DIASCORIN.

Derived from the Disascoria, Wild Yam.

Properties—Diaphoretic, antispasmodic.

Used in bilious colic.

Dose—Two to three grains.

DIGITALIN.

Derived from the leaves of the *Digitalis Purpurea.* (Common name—Foxglove.)

Properties and uses—In medicinal doses, Digitalin is diuretic and sedative. It exercises a powerful influence over the absorbent system; hence its indication in cases of dropsical effusions. It has the reputation of possessing cumulative properties, but this, we think, may be avoided by duly neutralizing the acidity of the system previous to its exhibition. It is employed in all febrile diseases, hemoptysis, neuralgia, mania, epilepsy, pertussis, asthma, rheumatism, dropsies, and diseases of the heart and kidneys. Its use implies the necessity of much caution.

Dose—One-fifth to one-half of one grain. [A dangerous remedy.—R. S. N.]

EUPHORBIN.

Derived from the root of *Euphorbia Corollata.* (Common names — Blooming Spurge, Bowman's Root, etc.)

Properties and uses—Emetic, cathartic, diaphoretic, expectorant, and vermifuge. Used in the forming stages of fevers, in dropsical affections, diarrhea, dysentery, and to expel worms. In small doses, it is diaphoretic, nauseant, and relaxant; in emeto-cathartic doses, it will sometimes produce a considerable degree of prostration, cold sweats, coldness of the extremities, and a sinking of the pulse. From this condition, however, the system soon reacts, and the patient incurs no permanent debility.

Dose—As an emetic, two grains; as a diaphoretic and expectorant, from one-fourth to one grain.

EUPATORIN (PURPU).

Obtained from the *Eupatorium Purpureum.* (Common names — Queen of the Meadow, Gravel Root).

Properties—Diuretic, stimulant, astringent, and tonic.

Used in strangury, gravel, and all chronic urinary disorders, gout, rheumatism, hematuria, hematamesis, hemoptysis, dysentery, etc. It has been found of great value in the treatment of the latter disease, and in pertussis, asthma, and all affections accompanied with dyspnœa, it has been found a valuable auxiliary.

Dose—Two to four grains.

EUPATORIN (PERFO).

Obtained from the *Eupatorium Perfoliatum.* (Common names — Boneset, Thoroughwort, etc.)

Properties—Tonic, aperient, diaphoretic, and emetic.

Used in intermittent fever, dyspepsia, and all cases of general or local debility, coughs, colds, catarrh, etc. It is sometimes given to promote the action of other emetics; and, aided by warm diluent drinks, will be found a valuable diaphoretic in fevers.

Dose—One to three grains.

EUONYMIN.

Obtained from the bark of the *Euonymus Americanus.* (Common names—Burning Bush, Waahoo, etc.)

Properties and uses—Tonic, laxative, alterative, and expectorant. This medicine is successfully used in the treatment of dyspepsia, torpid liver, constipation, and dropsy. It imparts tone to the stomach, and activity to the digestive organs.

Dose—One to three grains.

GELSEMIN.

Obtained from the root of the *Gelseminum Sempervirens.* (Common names—Yellow Jessamine, Woodbine, etc.)

Properties and uses—Febrifuge, antispasmodic and narcotic. As a febrifuge, the Gelsemin is a medicine of great power. Its use is indicated in all fevers, acute and chronic rheumatism, pleurisy, pneumonia, etc. It has been pretty thoroughly tested by physicians, both in the city and country, and all who have given it a fair trial acknowledge it to possess great merit. The following quotation will show in what estimation it is held by the most sanguine of its remedial properties. "It is, perhaps, the only medicine yet discovered capable of subduing, in from six to twenty-four hours, without the least possible injury to the patient, the most formidable, as well as the most simple fevers incident to our country and climate—quieting nervous irritability and excitement, equalizing the circulation, promoting perspiration, and rectifying the various secretions, without causing nausea, vomiting or purging, and is also adapted to any stage of the disease. It may follow any preceding treatment with safety." If the medicine possesses one-half of these virtues, it is worthy the careful attention of the profession. But the Gelsemin is not to be recklessly administered, as it has doubtless been in some cases, and with bad results. Its effects must be carefully watched. It is probably contra-indicated in all cases where there is structural disease of the heart, and in cases of great debility. In full doses, it produces narcotism, indicated by loss and prostration of muscular power, clouded vision, double-sightedness, and inability to open the eyes. But if the medicine is here discontinued, these effects pass off in a few hours, leaving the patient stronger, rather than debilitated. In some cases it is desirable to produce a state of semi-narcotism, and keep the patient in that condition some little length of time. Combined with hydrastin or quinine it is very efficacious in the treatment of severe cases of intermittent fever, and by such a combination it is less apt to narcotize. In acute diseases it is better to give it in small doses of from one-sixteenth to one-eighth of a grain, every one, two or three hours. In chronic diseases a medium dose may be given three or four times during the day.

From our experience in the use of the above article, we are inclined to give it a high rank as a vermifuge. In our hands it has proved highly successful in the removal of intestinal entozoa.

In the treatment of neuralgia, some practitioners deem it almost a specific.

Dose—One-fourth to one grain.

GERANIN.

Obtained from the root of the *Geranium Maculatum.* (Common names—Crane's Bill, Crow Foot.)

Properties and uses—One of the most powerful indigenous astringents, and its use is indicated in all cases where such medicines are used. On account of its being quite free from any unpleasant taste or odor, and the small doses, it is very convenient for administering to children, and persons of a delicate stomach. It has been found very serviceable in the treatment of hemoptysis, passive hemorrhages, ulcers, apthous sore mouth, gleet, leucorrhea, diabetes, and all excessive mucous discharges.

The Geranin is an excellent remedial in the treatment of dysentery and diarrhea, after the use of proper evacuants; also, in the latter stages of cholera infantum.

It has checked the vomiting in cholera when other means failed.

Dose—One to three grains.

HELONIN.

Obtained from the *Helonias Dioica*. (Common names—False Unicorn Root, Drooping Starwort, etc.)

Properties—Tonic, diuretic, vermifuge, etc.

Used in dyspepsia, loss of appetite, etc. Perhaps no medicine better deserves the name of an uterine tonic. Hence it is invaluable in the treatment of leucorrhea, amenorrhea, dysmenorrhea and all ulcerations of the uterus attended with atony, and to relieve a tendency to repeated and successive miscarriages. In chronic gastritis, and in the convalescing stage of acute diseases, where there is much gastric irritability, it will be tolerated by the stomach when other tonics are rejected.

Dose—Two to four grains.

HYDRASTIN.

Obtained from the *Hydrastis Canadensis*. (Common names—Golden Seal, Yellow Puccoon, etc.) We formerly put up two preparations of this plant, but we now combine all the four principles together, being convinced that in this form all indications may be met as readily with one as with our two formerly divided preparations.

Properties—Tonic, aperient, hepatic, deobstruent, antiseptic, resolvent.

It has an especial influence upon mucous surfaces, hence it is valuable in gleet, chronic gonorrhea, spermatorrhea, leucorrhea, and ulceration of the bladder, and other mucous surfaces. As an antiperiodic, some physicians prefer it to quinine. In intermittent and other forms of fever, dyspepsia, hepatic derangements, piles, and whenever a powerful tonic is required, it will be found an invaluable remedy.

Dose—One to two grains.

HYOSCYAMIN.

Obtained from the *Hyoscyamus Niger*. (Common name—Henbane.)

Properties—In large doses narcotic and dangerous. In medicinal doses, it is anodyne, soporific, antispasmodic and laxative. Usually given where opium disagrees, or where constipation is to be avoided.

Used in neuralgia, gout, rheumatism, asthma, chronic cough, irritability of the urinary organs, and in all nervous and spasmodic affections.

Dose—One-eighth to one grain.

IRISIN.

Obtained from the *Iris Versicolor*. (Common names—Flag Lily, Blue Flag.)

Properties—Alterative, laxative, diuretic, and anthelmintic. Its use is highly spoken of as an alterative in scrofulous and syphilitic affections, and is usually combined with the Podophyllin. It is a good auxiliary in the treatment of rheumatism, dropsy, gonorrhea, glandular diseases, chronic diseases of the liver and spleen.

Dose—Two to four grains.

JALAPIN.

Obtained from the rhizoma of the *Ipomœa Jalapa*. This is the resinoid of the Jalap, and is the cathartic principle of the plant.

The properties and uses of the Jalap are too well understood to need any lengthened description. It is well known to be an active hydragogue cathartic, producing copious watery stools, with nausea and griping. The Jalapin possesses all of these qualities, excepting that it is less apt to nauseate and gripe. It is usual to combine

it with some other cathartic, to modify its action. Used in dropsy, bilious fever, congestion of the portal circle, and in all cases where active catharsis is indicated.

Dose—Two to four grains.

JUGLANDIN.

Derived from the bark of the root of the *Juglans Cinerea*. (Common names—Butternut, White Walnut.)

Properties and uses—In large doses, emetic and cathartic. In small doses, laxative, cholagogue, deobstruent, detergent, diuretic, and alterative. Of exceeding value in the treatment of those fevers attended with gastric and enteric irritability, dysentery, habitual constipation, jaundice, dyspepsia, the various affections of the urinary apparatus, piles, and all visceral derangements. It operates without irritation, and leaves the bowels in a soluble condition.

Dose—Two to five grains.

LEPTRANDIN.

Obtained from the rhizoma of the *Leptandra Virginica*. (Common names—Black Root, Culver's Physic.)

Properties and uses—Alterative, laxative, tonic, and hepatic.

It is one of the very best medicines known, to correct and stimulate the hepatic secretions in those cases where it is desirable not to produce debility, by drastic alvine evacuations. It operates silently, yet surely. For the treatment of children and delicate females, and many chronic diseases, where there is deficiency of the proper biliary secretions, and where, from the advanced stage of the disease, the former use of drastic cathartics, rendering their repetition inadmissible, or any inflammatory condition of the stomach and bowels, the bowels can be moved, and the secretions regulated with the Leptandrin without danger of further prostration. It is very efficacious in the treatment of dysentery, diarrhea, and cholera infantum. In these diseases it is usually given in small doses, and repeated every one or two hours. The marked success which has attended the use of the Leptandrin, in the treatment of summer complaints, demands for it a more prominent place in our Materia Medica, and further observations as to its therapeutic effects. It is also used with marked success in typhoid fever, intermittent, dyspepsia, jaundice, piles, biliary derangements, combined with hydrastin or quinine. Valuable in the treatment of chronic laryngitis, bronchitis, and other affections of the throat and chest.

Dose—Two to four grains.

LOBELIN.

Obtained from the *Lobelia Inflata*.

Properties and uses—Emetic, diaphoretic, and expectorant. The Lobelin is a medicine of great power and merit, but will have to be used with caution. It is used in fevers, pneumonia, croup, asthma, and in cases where it is desirable to produce general relaxation of the muscular system, as in strangulated hernia, rigidity of the os uteri, etc.

Dose—One to two grains.

LUPULIN.

Obtained from the *Humulus Lupulus*. (Common name—Hops.)

Properties—Tonic, hypnotic, febrifuge, nervine, etc.

Used in dyspepsia, delirium tremens, hysteria, and all affections accompanied with nervous irritability. Also to relieve after-pains, prevent chordee, and relieve the pains attendant on gonorrheal affections. In chronic gastritis it is invaluable. Procures sleep, without producing the narcotic effects of opium, or constipating the bowels, and does not disorder the stomach.

Dose—One to two grains.

MACROTIN.

Obtained from the rhizoma of the *Macrotys Racemosa*. (Common names—Black Cohosh, Squaw Root.)

Properties and uses—Antispasmodic, narcotic, tonic, and emmenagogue, with a special affinity for the uterus. It is used in uterine diseases, leucorrhea, dysmenorrhea, sterility, chorea, hysteria, and as a parturient. In many cases it is desirable to give this medicine in such continued quantities as to produce its peculiar constitutional effects, viz: slight dizziness, fullness, dull aching of the head, and more or less aching of the joints; and to produce these effects, in some degree, every day while the medicine is being administered. Its use is also well spoken of in neuralgia, asthma, splenitis, pertussis, delirium tremens, and gonorrhea. As a parturient, the Macrotin is a remedy of considerable merit. It is quite as sure to increase the contractile power of the uterus as the ergot, but is not as violent in its effects. In those cases where the safety of the child would be endangered by the administration of the *secale cornutum*, and as a general partus accelerator, this article may be safely given.

Doses—One to three grains, three to six times per day. As a parturient, three to five grains, to be repeated in from thirty to sixty minutes, if necessary.

MYRICIN.

Obtained from the *Myrica Cerifera*. (Common name—Bayberry.)

Properties and uses—Astringent, stimulant and alterative. As an alterative the Myricin is a medicine of considerable value, but must be given in combination with some laxative to obviate its constipating tendency. It is successfully used in scrofula, dysentery, diarrhea, and where astringents or alteratives are indicated.

Dose—Two to four grains.

PHYTOLACIN.

Obtained from the rhizoma of the *Phytolacca Decandria*. (Common names—Garget, Poke, Scoke.)

Properties and uses—Alterative, and slightly narcotic and emetic. It is a valuable article, and an efficacious remedy in the treatment of chronic rheumatism, syphilis, scrofula, and cutaneous diseases. It is also considered a valuable remedy in hydrophobia.

Dose—One to three grains.

PODOPHYLLIN.

Obtained from the root of the *Podophyllum Peltatum*. (Common names—May Apple, Mandrake.)

Properties and uses—Alterative and cathartic. In doses of from four to six grains, the Podophyllin usually acts as an emeto-cathartic, with severe griping, nausea, prostration, and watery stools; two to four grains, as an active cathartic, leaving the bowels in a soluble condition; and one-fourth to one-half grain as an alterative and aperient. Its tendency to gripe will be lessened, or entirely obviated, by combining with it some stimulant.

In many respects the Podophyllin usually acts like the mercurial preparations. When given alone, its operation as a cathartic is slow, requiring from six to twelve hours for its full effects. If it is desirable to produce catharsis sooner than that, it is well to combine it with the bitartrate of potassa or jalapin. In doses sufficiently small not to purge, if frequently repeated, will produce in many persons incipient ptyalism. In a few cases, we have known this effect to follow the administration of a single cathartic dose; but it is always of a milder form than that produced by

mercurials, without any danger of producing the secondary effects which are so often observed after the free exhibition of that remedial agent.

Its use is indicated in all cases where mercurials are usually given, and as the profession generally understand the indications for their use, they will readily learn to use the Podophyllin by a transfer of that knowledge.

In glandular diseases, primary and secondary syphilis, dropsies, dysentery, diarrhea, disease or torpidity of the liver, and in nearly all cases where an alterative or a cathartic is indicated, the Podophyllin has been fully and successfully tested. When judiciously given, it seldom disappoints the reasonable expectations of the physician. For the expulsion of ascarides from the intestines, the Podophyllin has few superiors; also for the dislodgment and expulsion of biliary calculi, being given in full cathartic doses, and followed in four or six hours with from four to eight ounces of pure olive oil. This plan has been adopted in a number of cases, and large quantities of the calculi were passed with very little pain. When we consider the excruciating suffering which the passage of these calculi usually produces, any plan of treatment which will mitigate the intensity of the pain will be hailed with pleasure both by patient and physician.

Very much might be said on the merits and various uses of the Podophyllin, but the designed limits of this appendix forbid. The various indications and modes of combination of the remedy will readily suggest themselves to the physician's mind. From the success which has attended its administration, the Podophyllin bids fair to occupy a very prominent place as a cathartic and alterative, and the appellation of "Vegetable Calomel" is no misnomer. There are many cases of primary and secondary syphilis, occurring in persons of broken-down constitutions, where mercury has been administered as far as it is admissible, or its exhibition, on account of the strumous diathesis, would not be tolerated. In such and other cases, we invite the profession to try its merits, marking well its effects, and reporting to the profession, through the journals, the result of their observations.

POPULIN.

Obtained from the *Populus Tremuloides.* (Common names — Quaking Aspen, Upland Poplar, etc.)

Properties—Alterative, depurative, deobstruent, diuretic, tonic, and vermifuge; also febrifuge.

Used in indigestion, hysteria, flatulency, cutaneous diseases, worms, jaundice, fevers, etc. As a remedy for frequent and painful micturition, accompanied with heat or scalding, combined with a little tincture of myrrh, it perhaps stands unrivaled.

Dose—Two to four grains.

PRUNIN.

Obtained from the *Prunus Virginiana.* (Common name—Wild Cherry.)

Properties—Tonic and stimulant to the digestive organs, and sedative to the circulating and nervous system.

Used in phthisis, hectic fever, scrofula, intermittent fever, the convalescing stage of acute diseases, and in all conditions of extreme debility.

Dose—Two to three grains.

RHUSIN.

Obtained from the leaves of the *Rhus Glabra.* (Common names — Sumach, Upland Sumach.)

Properties and uses—Tonic, astringent, and antiseptic. A useful remedy in the treatment of dysentery, diarrhea, febrile diseases, diabetes, and leucorrhea. It is healing and soothing to the mucous membrane of the stomach and bowels, and is very useful in the treatment of chronic diarrhea, occurring in consumptive patients.

Dose—One to two grains.

RUMIN.

Obtained from the *Rumex Crispus.* (Common names — Yellow Dock, Sour Dock, etc.)

Properties — Antiscorbutic, detergent, alterative, and combining mild astringent and laxative properties much like rhubarb.

Used in scorbutic, cutaneous, strumous, carcinomatous, and syphilitic affections.

Dose—Two to four grains.

SANGUINARIN.

Obtained from the *Sanguinaria Canadensis.* (Common names—Red Root, Blood Root, etc.)

Properties and uses—Emetic, expectorant, and alterative. Used in diseases of the chest, influenza, rheumatism, diseases of the liver, etc.

Dose—One to three grains.

SCUTELLARIN.

Obtained from the *Scutellaria Lateriflora.* (Common names — Scullcap, Blue Scullcap.)

Properties and uses—Antispasmodic, nervine, and tonic. The Scutellarin is a valuable nervine, quieting the nervous system in many cases where other nervines entirely fail. For children, it is better, in most cases, than the preparations of opium. It has been found very serviceable in the treatment of convulsions, neuralgia, chorea, and all forms of nervous derangement. The nervous excitability, restlessness, and wakefulness attending acute and chronic diseases, can usually be controlled, and sleep procured by the administration of this remedy.

Dose—One to two grains.

SENECIN.

Obtained from the *Senecio Gracilis.* (Common names—Life Root, Cough Weed, Waw Weed, etc.)

Properties and uses—Diuretic, diaphoretic, febrifuge, tonic, pectoral, and emmenagogue. Used in gravel, strangury, and other affections of the urinary organs, amenorrhea, dysmenorrhea, pulmonary affections, hepatic derangements, pains in the chest, hysteria, hypochondria, and dysentery. Exercises an especial influence over the female reproductive organs.

Dose—Two to four grains.

STILLINGIN.

Obtained from the *Stillingia Sylvatica.* (Common names—Yaw Root, Queen's Delight, etc.)

Properties—Alterative, aperient, deobstruent, depurative, antisyphilitic, diuretic and tonic.

Used in scrofula, syphilis, rheumatism, cutaneous diseases, hepatic derangements, chronic laryngitis, chronic bronchitis, all morbid discharges from the vagina and uterus, the various forms of stomatitis, and in all cases in which a general alterative is indicated, than which perhaps nothing superior has yet been discovered. It exercises an especial influence over mucous surfaces, hence in the treatment of the

various forms of uterine disease, cystic and urethral inflammation, chronic inflammation of the bowels, accompanied with ulceration, and chronic dysentery, it fulfills important indications.

Dose—Two to four grains.

STRYCHNIN.

Derived from the seeds of *Strychnos Nux Vomica.* (Common name—Nux Vomica.)

The Strychnin manufactured now, differs from the strychnine of commerce, being a combination of the three therapeutic constituents of the seeds, viz : strychnia, brucia, and a neutral principle. The strength of the Strychnin, as compared with strychnine, is as twelve to eight. Thus, if the dose of strychnine be one-twelfth of a grain, the dose of Strychnin will be one-eighth of a grain, that is, one-third more than of the strychnine. For properties, uses, doses, etc., the practitioner is respectfully referred to the United States Dispensatory, and other standard works on Materia Medica. [This I never use.—R. S. N.]

TRILLIIN.

Derived from the root of *Trillium Pendulum.* (Common names—Beth Root, Birth Root, etc.)

Properties and uses—Trilliin is astringent, styptic, tonic, diaphoretic, expectorant, antiseptic, and alterative. Used in the treatment of hemorrhages, either external or internal, leucorrhea, and all diseases of the mucous tissues, prolapsus uteri, immoderate flow of the lochia, restraining without suppressing, hooping cough, asthma, etc.

Dose—From two to four grains.

VERATRIN.

Obtained from the *Veratrum Viride.* (Common names—American Hellebore, Swamp Hellebore.)

Properties—Narcotic, emetic, diaphoretic, cathartic, etc.

Used in pneumonia, rheumatism, pleurisy, typhoid, bilious and intermittent fevers, and in most cases where there is high febrile and inflammatory action. In the treatment of dysentery, it is a superior auxiliary, given every three or four hours, following it in one or two hours with one or two grains of the Geranin.

There are but few remedies by which the heart's action can be so readily and surely controlled as with the Veratrin, which renders it a valuable remedy in palpitation, and where there is high arterial excitement. It may also be used in neuralgia, etc.

The Veratrin has attracted the attention of the profession but very little till within a few years. But recent investigation and experiments, have more fully developed its power and efficacy in the treatment of disease. We have used it more or less since 1840, and being fully convinced of its merits, have been led to prepare it for the profession. Like all new remedies of any merit, its valuable properties have probably been overrated by some of the more zealous of its advocates. But, after using it sixteen years, we trust that our zeal has become moderated to that degree which will allow us to speak of the Veratrin in such general terms that no one will be disappointed after fully testing it.

The Veratrin is a medicine of great power, and capable of producing serious results, when recklessly or empirically administered ; when given in full or over doses produces vertigo, faintness, headache, dimness of vision, paleness, coolness, prostration, and violent emesis. When used in proper quantities, it excites diapho-

resis, reduces the force and frequency of the heart's action, allays nervous excitability, subdues pain, and sometimes produces nausea and vomiting.

Dose—One-eighth to one-half grain.

VIBURIN.

Obtained from the *Viburnum Oxycoccus.* (Common names—High Cranberry, Cramp Bark.)

Properties and uses—Antispasmodic. It is very useful in hysteria, asthma, cramps of the limbs, convulsions during pregnancy, etc.

Dose—One to three grains.

XANTHOXYLIN.

Obtained from the *Xanthoxylum Fraxineum.* (Common name, Prickly Ash.)

Properties—Stimulant, tonic, alterative and sialagogue. Used in rheumatism, scrofula, paralysis, indigestion, colic, syphilis, hepatic derangements, and joined with tonics to quicken their appropriation by the nutritive functions. There is perhaps no better *permanent stimulant* than this. Hence in cold and languid states of the system, it is of great value. As a constitutional remedy in the treatment of old and indolent ulcers, it has proved remarkably efficacious. It has been found valuable in the treatment of intestinal ulceration, and combined with Stillingin, in the atonic condition which frequently follows an attack of cholera infantum. In hemorrhage of the stomach, bowels or urinary organs, we have found it an invaluable remedy.

Dose—One to two grains.

CONCENTRATED TINCTURES.

Con. Tinc. Apocynum Andro.—Dose, two to four drops.

Con. Tinc. Chelone Glab.—Dose, two to four drops.

Con. Tinc. Digitalis Purp.—Dose, one to two drops.

Con. Tinc. Euonymus Amer.—Dose, two to six drops.

Con. Tinc. Eupatorium Purp.—Dose, four to eight drops.

Con. Tinc. Gelseminum Semp.—Dose, five to thirty drops.

Con. Tinc. Gossyppium Herb.—Prepared from the bark of the root of Gossyppium Herbaceum, or cotton plant.

Properties and uses—Emmenagogue, parturient, and abortive. Used in the treatment of chlorosis, amenorrhea, dysmenorrhea, and to facilitate parturition.

Dose—One to two drops.

Con. Tinc. Rhus Glab.—Dose, two to four drops.

Con. Tinc. Scutellaria Later.—Dose, two to four drops.

Con. Tinc. Senecio Gracil.—Dose, four to eight drops.

Con. Tinc. Strychnos Nux Vomica.—Dose, one-fourth to one drop.

Con. Tinc. Veratrum Viride.—Dose, one to five drops.

Con. Tinc. Xanthoxylum Frax.—Dose, two to four drops

Wine Tinc. Lobelia Infl.—Dose, as an emetic, one to four fluid drachms; as a diaphoretic and expectorant, five to twenty drops.

Con. Comp. Stillingia Alterative:

Rad.—Stillingia Sylvatica.
" Corydalis Formosa.
" Phytolacca Decandria.
" Iris Versicolor.
Cort. Xanthoxylum Fraxineum.
Fol. Chimaphila Umbellata.
Sem. Cardamomum.

This is a powerful and efficient alterative, and is adapted to fulfill the morbid indications of disease.

In the treatment of syphilitic affections it is invaluable. In strumous, cancerous, cutaneous, and rheumatic affections, and, in short, in every morbid cachexy, where a powerful alterative and depurative is indicated, it may be advantageously employed; also in bronchitis, hepatic derangements, leucorrhea, etc.

Dose—One to five drops, in a little water, sweetened if desired.

Bronchitis Drops:

R.—Rumex Crispus.
Rhus Glabra.
Hyoscyamus Niger.
Uvularia Perfoliate.
Cypripedium Pubescens.

Properties and uses—Alterative, tonic, stimulant, sedative, nervine, and astringent. An invaluable remedy in the cure of bronchitis. In the treatment of bronchitis and throat diseases, these drops should be applied once or twice a day, as far as possible, to the parts, affected, especially in laryngitis.

Dose—Five to ten drops, to be repeated according to the urgency of the case.

CONCENTRATED TINCTURE OF GELSEMINUM.

The tincture is very convenient for administration. Dose, five to thirty drops, in a wineglassful of water. Diluted with four to eight parts of water, and dropped into the ear, it has been found to effectually relieve ringing and other unpleasant noises in the head, and to improve the hearing.

CONCENTRATED TINCTURE OF VERATRUM VIRIDE.

Properties and uses—Similar to the Veratrin.

Medium dose—Five drops, in a little water.

OILS.

CAPSICIN OR OIL OF CAPSICUM.

Obtained from the *Capsicum Baccatum.* (Common names—Bird Pepper, Cayenne Pepper, etc.)

The Capsicin is an oleo-resinous substance, of a reddish-brown color, and readily soluble by heat, alcohol, ether, and oil of turpentine.

Properties and uses—A powerful stimulant. Beneficially used in cases of an enfeebled or inactive stomach, dyspepsia, lethargic condition of the system, etc. In the treatment of scarlet fever and malignant sore throat, it is a most valuable remedy, both internally and as a gargle. As a gargle, it must be greatly diluted; as a rubefacient, the Capsicin is an elegant remedy. It acts very speedily, and is not liable to produce vessication. One ounce of the oil, in from four to eight ounces of alcohol, makes a strong rubefacient liniment. In this form, it is beneficially used in rheumatism, paralysis, sciatica; or, in severe cases, it may be used of full strength.

Dose—As a stimulant, one to two drops, on a little sugar. After thoroughly triturating it with sugar, it may be dissolved in a little hot water if desired.

OIL OF ERIGERON.

Obtained from the *Erigeron Canadense.* (Common names — Canada Fleabane, Scabious, etc.)

Properties—Astringent, styptic, and diuretic.

Used internally in the treatment of uterine hemorrhage, menorrhagia, dysmenorrhea, hemorrhage from the lungs, stomach, kidneys, or bowels, and gonorrhea.

Externally, dissolved in alcohol, for rheumatic and other painful swellings; to the throat in laryngeal and bronchial affections, and applied to chronic enlargements of the tonsils, speedily discusses them. For external use, one ounce to four or eight of alcohol. We believe, as the result of experience, that the oil of the Erigeron Canadense is possessed of superior therapeutic powers to that obtained from the Erigeron Philadelphicum.

Dose—Two to four drops.

OIL OF POPULUS TREM.

Properties and uses—Stimulant, tonic, and diuretic. Used in bronchitis, dyspepsia, and affections of the kidneys.

Dose—Five to ten drops.

OIL OF STILLINGIA.

Obtained from the *Stillingia Sylvatica.* (Common names — Queen Root, Yaw Root, etc.)

Used externally as a counter-irritant and discutient. Dissolved in alcohol, either alone or combined with the oils of lobelia and cajeput, it is applied to painful rheumatic swellings, contractions of the joints, curvature of the spine, and to discuss indolent tumors.

OIL OF XANTHOXYLUM FRAX.

A permanent and diffusive stimulant.

Used for the same purposes as the other preparations of the plant.

Dose—Two to five drops.

OLEO-RESIN OF LOBELIA.

Properties—Similar to the Lobelia.

The oil is given in doses of two to five drops, triturated with a little loaf-sugar, to be repeated as occasion may demand.

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