Observations on the surgical anatomy of the head and neck : illustrated by cases and engravings / by Allan Burns.

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SURGICAL ANATOMY

OF THE

HEAD AND NECK.

MED. EDIN.
COLL. REG.

OBSERVATIONS

ON THE

SURGICAL ANATOMY

OF THE

HEAD AND NECK,

ILLUSTRATED BY

Cases and Engravings.

COLL. REG. MED. EDIN. H.

BY ALLAN BURNS,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, LONDON; AND LECTURER ON ANATOMY AND SURGERY, GLASGOW.

SECOND EDITION.

WITH A LIFE OF THE AUTHOR,
AND ADDITIONAL CASES AND OBSERVATIONS.

BY GRANVILLE SHARP PATTISON,

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF MARYLAND,
&c. &c. &c.

GLASGOW:

PRINTED FOR

WARDLAW & CUNNINGHAME:

AND LONGMAN, HURST, REES, ORME, BROWN, & GREEN,

LONDON.

1824.

JAMES STARKE, PRINTER, GLASGOW.

EDITOR'S PREFACE

TO THE

FIRST AMERICAN EDITION.

To affix one's name to the productions of others as the editor of their works, has ever appeared to me a very humble office for a man who has a respect for his own reputation. I am aware that this has been much in fashion in this country; and, that even men of distinguished character and great acquirements, have condescended to become the mere press correctors for their Transatlantic brethren. I trust the day will never arrive when we shall cease to value European publications of merit; but, I sincerely hope, that the time is now at hand, when men of talent in this country, will disdain to become the name-fathers

of works for which they have only performed the slavish duty of reading the proofs, and correcting the typographical errors. As I at present appear before the public in this character, one, which under other circumstances I should consider a degradation, I am very anxious that the objects which have induced me to do so, should be fully understood.

My late very dear friend, Allan Burns, published the present volume as the commencement of a series, it having been his intention to have proceeded upon the same plan, and described all the other parts of the body, so as to have formed a complete system of Surgical Anatomy. The Surgical Anatomy of the Head and Neck, was however, all of the work which he was permitted to finish, and I am not aware that he has left a single note for the completion of the other departments of the system.

Honoured by Mr. Burns during the term of my professional studies, with a friendship and affection which resembled more the love of a brother than the regard of a preceptor, at his death I was be-

queathed, as a testimony of his esteem, the copyrights of all his works. My having become the legal possessor of these, is not however the cause which has induced me to become their editor. The Surgical Anatomy of the Head and Neck having been out of print, I was applied to, before I left Europe, for permission to publish a new edition, to continue myself the plan which Mr. Burns had commenced, and to complete, by a series of new volumes, the Surgical Anatomy of the whole Body. My removal to this country having prevented me at that time from fulfilling this engagement, the object of the present publication is now to commence it, and I propose to publish every autumn a new volume, until the system shall be completed. Feeling persuaded from my education, that had I attempted to write myself the volume on the Head and Neck, that my views and descriptions would have borne so close a resemblance to those of Mr. Burns, as to have subjected me to the charge of plagiarism, I have considered it best that his work should form the first volume of the series.

In republishing the Surgical Anatomy of the Head and Neck, I have added a life of the author, and an Appendix. In the former, I have given a very short history of Mr. Burns' professional labours, other circumstances having been merely stated so far as they have tended to connect and illustrate their origin, and the order of their occurrence. Knowing well the high reputation which this book has obtained in Great Britain, I have felt so apprehensive, lest it should be suspected that by its publication, I was desirous to obtain a surreptitious reputation, that even in the Appendix I have endeavoured to avoid, as much as possible, any appearance of attempt at originality. Therefore, in stating any improvements, I have employed, where I had the power, the language of their authors. I once intended to have posted up all that had been done in the branches of surgery mentioned in this work, from its publication to the present day, but, I soon discovered that to do so, I should have been obliged to make the Appendix as large as the rest of the book. I have therefore confined myself to the relation of some remarkable cases which, from

their connexion with the anatomy of the head and neck, tend either to support or controvert the opinions of Mr. Burns. In the future volumes, the subjects of aneurism, tumours, &c. &c. will necessarily require to be mentioned, and I shall then have an opportunity of laying before my readers, a concise statement of any new views or modes of treatment introduced to public notice, since the date of the publication of the first edition of this work.

Baltimore, Oct. 10, 1823.

A

SHORT ACCOUNT

OF

THE LIFE OF THE AUTHOR.

Mr. Allan Burns was born at Glasgow, on the 18th of September, 1781. His father, the Rev. John Burns, D. D. is still alive, and is one of the oldest and most respectable members of the Established Kirk of Scotland.

The period of Mr. Burns' life prior to the commencement of his medical studies, was marked by no event worthy of notice. By his teachers and friends he was considered a boy of good talents; but it was only after he commenced the study of medicine, a pursuit towards which his mind seemed, from his earliest boyhood to have a particular bent, that his abilities were brought into full action.

At the early age of fourteen years, Mr. Burns entered the medical classes, and by his diligence and

application, he was enabled two years afterwards to take upon himself the sole direction of the dissecting-rooms of his brother, Mr. John Burns, who, at that time was a lecturer on anatomy and surgery in Glasgow. From the excellent opportunities he here enjoyed for cultivating the study of anatomy, and from the enthusiasm with which he pursued anatomical inquiries, it is not surprising that he soon became a very good practical anatomist. But his mind was not to be satisfied with mediocrity; he was anxious to be superior, not equal with his cotemporaries. Placing before himself, as models for imitation, the men who had been the most distinguished in his profession, and aware, from their histories, that they had only obtained honour and eminence by unwearied application, his exertion in the pursuit of professional knowledge, so far from relaxing, increased with his acquirements.

In fulfilling the duties of his situation as his brother's demonstrator, it was necessary for Mr. Burns to be much occupied in making anatomical preparations. The preservation of preparations in spirits was performed before his time, in as elegant a manner as possible by the Hunters and Munros. Vascular preparations were, however, by no means, dexterously executed; to the preser-

vation of these he therefore particularly directed his attention;—he changed both the injections and manner of injecting; he dissected the parts more minutely than had been done before him, and, from his attention to this branch, I can state without hesitation, that his collection of vascular preparations were, at one time, superior to any other in the world.

Mr. Burns' time was, however, at this period by no means wholly occupied in making preparations; he visited a number of his brother's cases, and noting the symptoms of the different diseases, he endeavoured to explain these on anatomical principles. Where the patients died, he, if possible, obtained permission to inspect the body, and, when he succeeded in this, he compared the morbid appearances with his former speculations, which, if correct, became fixed on his mind; if the reverse, he endeavoured to account for the symptoms from the disorganization which had been produced. Conducting these examinations with a minuteness and attention which is very rarely bestowed upon them, he was much struck with the frequency of mal-formation in the mechanism, or morbid change in the structure of the heart. In a number of cases, where the symptoms

manifested during the progress of the disease, had led the physician to form very incorrect views as to its seat, his dissections proved the heart to have been the viscus affected. Cardiac affections appeared to him to be a subject so important, yet so little understood, that he devoted himself with great attention to their investigation. He watched, and endeavoured to distinguish and characterize the Protean symptoms which they presented during life; and after death the morbid changes were attentively noted. From Mr. Burns' labours in this hitherto much neglected class of diseases, he had soon in his Case Book a vast fund of original information on these interesting, but ill understood affections. At this period, however, he had no intention of publishing on that subject, his attention being much occupied in collecting materials for a work which he proposed to give to the public on the subject of Hernia.

Mr. Burns, during the summer of 1802, whilst dissecting the part concerned in the operation for crural hernia, discovered a process of the *fascia lata*, which had never before been described by anatomists, and in attending to the pathology of the disease, in relation to this process, which he named *falciform*, he found that it had a very great

effect upon the strangulation in certain cases of incarceration. It was this discovery which led him to pay particular attention to hernia, and to prepare for the press the work on that subject, which has been already alluded to. The publication of Mr. Cooper's splendid work on hernia, prevented him from laying his thoughts on this subject before the public in the form of a volume. He, however, in the year 1806, published a very perspicuous paper "On the Anatomy of the parts concerned in Femoral Rupture," in the Edinburgh Medical and Surgical Journal.

In the year 1804, Mr. Burns, having determined to enter the medical service of the army, went to London, for the purpose of obtaining a commission; but, previous to his making an application for one, he received a letter, offering him a situation in St. Petersburg, of which he accepted, and accordingly left London for the purpose of repairing to Russia.

The Empress Catharine, acting in the name of her son Alexander, having established, in the metropolis of her country, an hospital on the English plan, was desirous of procuring for its director an able British surgeon. For this office Mr. Burns was named to her majesty, by his ex-

cellency Dr. Creighton, as a gentleman in every way qualified; the appointment was accordingly immediately offered for his acceptance—and, by a further indulgence of the Empress, he was allowed to remain six months in the country, before he was required to make up his mind on the subject of the appointment. Passionately attached to the customs and institutions of his own country, after the term of trial, he could not be induced, valuable as the appointment was, to accept of it; and the Empress, finding that his determination to return to Scotland could not be changed, presented to him, in testimony of her admiration of his character, a very valuable diamond ring.

In the month of January, 1805, Mr. Burns left St. Petersburg, and having travelled through Sweden, he arrived in London the following April.

Mr. John Burns having discontinued his lectures on anatomy and surgery, the idea of returning to Glasgow and delivering lectures on these subjects, was first suggested to his brother's mind whilst residing in Russia. This plan was so congenial to his inclination, that on his return home, he at once began to occupy himself in pre-

paring a course of lectures; and the following winter he commenced his career as a Public Teacher.

In the autumn of 1808, Mr. Burns prepared his work on the Diseases of the Heart for publication, and printed it early the following spring.

During the spring of 1810, Mr. Burns was attacked with dyspeptic symptoms. With the view of removing these, he was induced, at the termination of his lectures, to travel to the island of Arran, where he remained a month. From this journey, his health was so completely re-established, that he was enabled, on his return to Glasgow, to enter again, with his wonted ardour on his professional pursuits. The restoration to health was, however, of short duration; his close application to study, and constant attendance at the dissecting rooms, having been the causes which originally gave the disposition to the disease, soon reproduced it. In a few months he was in a much worse state of health than he had been previous to his visit to Arran; but, so much interested and occupied was he in preparing materials for the publication of his work on the Surgical Anatomy of the Head and Neck, that no

persuasions could prevail upon him to relax in his application and visit the country.

His complaints increased so rapidly during the spring of 1811, that he was with great difficulty enabled to finish his lectures. So soon as he had concluded them, he left Glasgow for the island of Cambray, where he remained for a month. His health having been considerably benefited by this short visit, the hopes of his friends became elevated, and he was induced, by their solicitations, to remain for only a very short time in Glasgow. To gratify them, he determined to make a voyage to the Hebrides.

From the sea air, exercise, and change of scene, Mr. Burns appeared to derive much benefit, but, towards the close of the voyage, he had a most severe attack of cholera morbus, a disease to which he had not before been subject, and which, in a great measure, destroyed all the advantages which he had before received from his excursion. Indeed, he returned to Glasgow in the month of September, in a more debilitated state of health than when he left it, on his departure for the Hebrides. Yet, although his health was in a most wretched state, his mind was still in the meridian of its vigour; his ardour in the improve-

ment of his profession continued unabated, and his zeal was such, that, immediately after his return to Glasgow, he laboured more diligently than ever, in finishing his work on the Surgical Anatomy of the Head and Neck, which he published a few months afterwards.

This second work of Mr. Burns, must remain a most valuable standard work as long as surgery continues to be cultivated as a science. It contains no hypothesis nor theories, but consists entirely of pathological inferences, drawn from the most acute and accurate observations on the anatomical structure of the parts.

Ever after the period when Mr. Burns had the attack of cholera morbus, he continued so subject to this complaint, that if he happened to eat fruit, or was exposed to the slightest change of temperature, he was seixed with a paroxysm of this most painful disease. From the frequent recurrence of the cholera, and the continued uneasiness produced by the dyspepsia, his strength and spirits became so much exhausted during the winter session, that he was under the necessity of concluding his lectures a month before the usual period for their termination; and, immediately on their conclusion, he left the city for the island of

Bute, where he remained until the month of September.

Having occasion to visit London that summer, I was separated from Mr. Burns for the first time since the commencement of our acquaintance. When I visited Bute, after an absence of three months, I was delighted to observe the great improvement which air and exercise had produced in his appearance. He seemed restored to perfect health; but, unfortunately, all he had gained during the summer, was lost by a violent attack of cholera, which he had the day after his return to Glasgow. As this paroxysm may be considered as the primary cause of the disease which produced Mr. Burns' death, a particular account of it may be interesting.

The evening before the attack, Mr. Burns and myself spent together in the dissecting-room. We were busily employed in dissecting and preparing a piece of morbid structure, and were under the necessity of using, in its preservation, a considerable quantity of corrosive sublimate. Whether a small quantity of this mineral had or had not been inhaled by Mr. Burns, it is impossible to decide. The violence of the attack of cholera which followed seemed to indicate some such cause for its production. On

taking leave of me, after our departure from the dissecting-rooms, he appeared to have a melancholy foreboding of what was to happen, and unfortunately it was too just. At two o'clock in the morning I was called up by a messenger, requesting me immediately to visit him. Upon my arrival at his house, I found him in a state of the most indescribable agony. The violence of the disease was such, that not only the muscles of the abdomen, but likewise those of the extremities, were under the influence of severe spasms. Laudanum and other medicines were administered in very large doses, but he remained in this state of suffering until eight o'clock, a. m. when the symptoms began gradually to abate. For some days afterwards his life was despaired of, but by care and attention, he was enabled in a fortnight to leave his bed.

From an anxiety to gain sufficient strength to enable him to fulfil his laborious winter vocations, so soon as Mr. Burns was able to travel, he returned to the island of Bute, where he remained for three weeks. From this visit his general health was considerably benefited, but he suffered constantly during his absence, from a severe pain in the right iliac region, the muscles in this situa-

tion having been particularly affected with spasms during the late attack of cholera. This pain continued, although with less severity, after his return home; he described it as perfectly fixed, and so local that he could cover it with the point of his finger.

In this miserable state of health, Mr. Burns commenced his last course of lectures, but was only permitted to continue them for a very short time. During the second week of the session, an abscess burst into the rectum and discharged about two ounces of pus. The discharge became every day more and more profuse; the constitution began to suffer, and in a week Mr. Burns found it necessary to confine himself to his bed, which he never afterwards left for more than a few hours.

It is unnecessary to detail the progress of the disease; like other internal abscesses, it undermined the powers of the system, and speedily produced hectic fever, which terminating in colliquative diarrhœa, closed the scene on the twenty-second day of June, 1813.

Twenty-four hours after death the body was examined by Dr. Brown, Mr. Russel, and some other professional gentlemen.

From the last attack of cholera morbus until the period of his death, Mr. Burns having complained of a continued and local pain in the situation of the right iliac region, this part of the abdomen naturally attracted particular attention. The most superficial examination at once discovered that morbid changes had taken place in it. The caput colli, instead of being simply bound down to the surface of the iliacus internus, by the inflexion of the peritoneum, was firmly united by a deposition of coagulable lymph to that membrane, where covering the inferior portion of the transversalis abdominis, the adhesion between this part of the muscle and the caput colli, was so perfect, that the one could not be separated from the other. On dissecting and separating the transversalis from the obliquus internus, an abscess was discovered situated between them, just above the point where they are attached to Poupart's ligaments. From this abscess, two sinus openings passed off; on tracing them, the one was found to terminate in the caput colli, and the other was followed completely under that portion of the intestine towards the promontory of the sacrum; from thence taking as its guide the rectum, it ran down about four

inches, and then entered the gut. The other viscera of the abdomen, as well as those of the chest, were healthy. This examination satisfactorily explained all the circumstances of the case. The spasm, which was particularly severe, during the last attack of cholera, in the situation of the right iliac region, had probably produced a tearing of the fibres of the transversalis muscle. This was followed by inflammation, which ended in suppuration. An abscess being thus formed between the obliquus internus and transversalis abdominis, ulceration of that portion of the latter muscle which formed the abdominal wall of the sac naturally occurred. The peritoneum covering it became inflamed, and, as the inflammation of that membrane is necessarily followed by the effusion of coagulable lymph, an adhesion was established between it and the caput colli. The abscess being thus prevented from discharging its contents into the belly, sinuses passed off from it, one of which opened into the caput colli, and the other into the rectum.

Before concluding this biograghical sketch of Mr. Burns' life, it is proper to make a few observations on his character, viewed as an AUTHOR, a PUBLIC TEACHER, and a MAN.

Mr. Burns has left behind him four works. Two of which were Essays published in the Medical and Surgical Journal of Edinburgh. The one on the anatomy of the parts concerned in the operation for Crural Hernia, and the other on the operation of Lithotomy. His first elaborate work is an octavo volume of three hundred and twenty-two pages, entitled. "*Observations on some of the most frequent and important diseases of the heart; on aneurism of the thoracic aorta; on preternatural pulsation in the epigastric region: and on the unusual origin and distribution of some of the large arteries of the human body. Illustrated by cases.*" The other is the work now offered to the profession in America. Of the Essays which he published in the Edinburgh Journal, I shall only observe, that they display great anatomical knowledge, and that perspicuity of description for which Mr. Burns was eminently distinguished, both as a writer and a teacher.

When it is recollected, that although "before the publication of Mr. Burns' book, many detached works had been published on particular affections of the heart, that, still no treatise had appeared presenting a connected view of the causes

and consequences of the various diseases to which that most important organ is liable," and when it is further remembered, how insidious and difficult of explanation many of the symptoms of these diseases are, and how apt they are to be mistaken for other affections, the value of Mr. Burns' work will be duly appreciated. The valuable work of Corvisart on this subject, which was published in France about the same time, may be considered, in connexion with Mr. Burns' book, as fixing an important era in the history of these most important, and heretofore, ill-understood diseases. Both works possess many and peculiar excellencies; but I trust I shall not be accused of permitting the feelings of friendship to influence my judgment, when I give it as my opinion, that, as a book of practical observation and philosophical explanation of the causes of symptoms, from anatomical connexions and change of structure, the treatise of Mr. Burns is decidedly superior to the one published by the Parisian Professor.

The second of Mr. Burns' great works is now presented to the American public. It has been considered by Sir Astley Cooper, Mr. Abernethy, and the other distinguished public teachers of Lon-

don, as well as by those in other parts of Great Britain, as one of the very best books on surgical anatomy, and that it will obtain the same rank in this country, I cannot doubt. In doing justice to the author, it should be recollected, that the plan of writing general observations on surgery with anatomical descriptions, is in a great measure peculiar to himself. Since his time, this has become general, and its excellency is now universally admitted.

Mr. Burns' style, as a writer, is far from being free from defects. Accustomed from very early youth to the habit of extemporaneous speaking, he acquired a rapidity of expression, which, although sufficiently correct for the purposes of oral demonstration, was too diffuse and colloquial for written compositions. Yet, although his manner is far from being critically correct, there is still a vividness and perspicuity in his descriptions which repays us for their want of elegance.

It is very justly observed by Mr. Burns' reviewers, that "a more zealous and eloquent teacher was never known." Possessing the most perfect knowledge of his subject, he was never at a loss in his descriptions, nor in want of materials for the illustration or elucidation of his subject. He

had likewise a most happy talent for arresting the attention, and of throwing around the most dry demonstrations a charm of which they could hardly be supposed to be susceptible. For perspicuity he had certainly no equal. The most intricate subject became, from the lucid order he pursued in their demonstration, clear and simple.

Mr. Burns' temper was warm, perhaps irascible, his passion however was but for a moment; and if, under its influence, he did any one an injury, he was the first to confess it and make ample reparation. In his intercourse with mankind, he was a perfect gentleman. To his friends his manners were most endearing. Destitute of every selfish feeling, he had their interests more at heart than his own, and for them he was at all times ready to make any personal sacrifice. For four years I was scarcely an hour separated from him, and it is now with feelings of gratitude I acknowledge, that if I have been at all successful, either as a Practitioner or Public Teacher, it is to his example and friendly instruction I am in a very great measure indebted for my success.

AUTHOR'S PREFACE

TO THE

FIRST EDITION.

In the following work it has been my object to describe the Surgical Anatomy of the Head and Neck. I have not, however, entirely confined my attention to the anatomy of the head and neck, and to the practical deductions from that alone; but, on the contrary, I have entered pretty fully into the consideration of the general principles which ought to regulate us in the treatment of some diseases incident to the neck, in common with other parts of the body. This I have especially done in regard to Aneurism, the practical doctrines of which I have examined, and, in some instances, freely criticised. I have also entered occasional remarks on the nature of tumours, but these are very cursory and limited. They are, however, as full as I thought my object in introducing them required.

In the following pages, I have treated the names of some of the promoters and improvers of our art with freedom; but, I trust, on no occasion with disrespect. I have combated opinions, but never because they belonged to this or to that author, but because I believed them to be erroneous.

In executing the surgical part of this book I have collected my facts from various sources, which I have generally acknowledged; but in regard to the anatomical part, there are few descriptions introduced which have not been given from numerous observations and dissections made by myself. I would also wish it to be understood that I have never described the relative anatomy of a part, from any individual subject; on the contrary, each description has been drawn up from the inspection of many bodies.

In doing this, the points wherein these corresponded were noted, and assumed as a standard, and the anomalies, where of practical importance, were not overlooked. Most, however, of what relates to varieties in the origin and position of the arteries, has already been made public in a paper on that subject, contained in a book which I lately published on the Diseases of the Heart.

For every quotation, therefore, from that work, I consider the present acknowledgment sufficient.

To obtain correct anatomical descriptions, and to deduce from them just practical conclusions, has been my anxious endeavour; how far I have succeeded in the execution of this part of my plan, belongs to others to decide. I may, however, with propriety, mention, that the descriptions are not the result of hasty examinations;—they were sketched six years ago, during which time I have carefully compared many subjects, and added cases in illustration as they occurred.

The present volume has no pretensions to more than merely containing a few hints, and these not always in very regular order, of the most important surgical anatomy of the head and neck—hints which I hope will be found useful by the student, but most of which are probably familiar to the experienced practitioner. It will be found very different from the elementary works on anatomy, which are required to initiate the student to names and individual parts:—the present observations being intended to introduce him to the contents of regions.

As a book of this nature would be of no value, without sketches to illustrate the descriptions,

Mr. WILLIAM P. HODGE, of St. Eustatius', an industrious pupil of mine, has had the goodness to give his assistance in this department. As all of the drawings were made under my own inspection, and by one acquainted with the anatomy of the parts he was delineating, I flatter myself they will be found faithful copies of nature. Some of them are mere sketches, others are more finished drawings; but in no instance have we ever sacrificed accuracy of representation for beauty of execution.

It has been mentioned by some authors, that to render plates really useful, the parts ought to be of their natural size; but this I have never considered essential. Drawings, I am convinced, may be employed advantageously of any size, provided, in reducing them, the proportion of the different parts be justly preserved; and I am equally persuaded, that in delineation of natural texture, it is not necessary to colour the bones, muscles, vessels, and nerves. CAMPER, by a few well chosen lines, has, in his inimitable plates, expressed more than many modern artists do, with their varied tints and complicated shading. A highly finished drawing certainly does please the eye more than an unpolished sketch; but in

the former, it is to be remembered, that boldness and accuracy are often sacrificed to elegance.

With these remarks I lay the following Observations before the public, with an anxious wish that they may prove useful to the student and young surgeon, for whom they are chiefly intended. They may, perhaps, lead him to combine circumstances, and to judge from these how far an operation would be advisable, in any individual case; or they may put him on his guard against undertaking rashly, an operation with which, had he been better acquainted with the group of parts concerned, he would prudently have declined interfering. If, indeed, in any way, he find them useful to him, I shall not view the time employed in arranging them as mispent.

Glasgow, 10*th October*, 1811.

OBSERVATIONS

ON THE

SURGICAL ANATOMY

OF THE

HEAD AND NECK.

In works on Anatomy, each separate system is generally considered apart, and without a reference to the others; and in surgical books, it is presumed that the student has already acquired a sufficient knowledge of the structure of the human body. Although we have, perhaps, little reason to complain of the want of tolerably accurate descriptions of the bones, the muscles, the blood vessels, the nerves, the absorbent system, and the glands; still, this to the operator is not sufficient. It requires a greater degree of discrimination, and a more accurate conception of the parts, than most students, nay, I believe, than most surgeons possess, to be able to combine these disjointed lessons, so as to form from them a useful

and connected whole. I am afraid, that in planning operations, the surgeon, too frequently, proceeds on a limited view of the parts amongst which he has to cut. More than once I have heard the propriety of an operation argued from the inspection of a mere blood vessel dried preparation;—a guide surely more liable to mislead, than to lead to a rational practice. The blood vessels are, no doubt, highly necessary to be perfectly understood, but this knowledge, to be practically useful, must be conjoined with a comprehensive acquaintance with the neighbouring parts. On this account, I endeavour to connect the demonstrations of the arteries, with the local structure of the muscles, nerves, and glands, and with the performance of surgical operations. That this is the most adviseable plan of teaching the student the true value of anatomy, few will dispute; but I fear that the execution will not prove equal to the design.

In attending to the general structure of the neck, the platysma myoides and the fascia must be first considered, for both have a share in modifying disease. The platysma myoides lies immediately below the skin and cellular membrane. It is often composed of a slender set of pale scattered fibres, but sometimes, and especially in short thick-necked males, it forms a strong muscular defence to the throat. It covers the front and sides of the neck, is attached to the

cellular membrane lying over the jaw bone, and is indistinct at its termination, where it is incorporated with the fat and fascial muscles. No doubt, as this muscle is attached to the integuments, it can wrinkle the skin of the neck, as in rage, or depress the angles of the mouth, as in grief; but these are subordinate and accidental offices performed by this muscle, whose chief use is surely to support the deep seated parts. Besides the platysma myoides, the throat is covered by an aponeurosis or fascia. My attention was first called to this fascia about seven years ago, during the dissection of an emaciated anasarcous subject, in which it was nearly as strong as the fascia of the limbs. Since that time, I have uniformly demonstrated it in every course.

The cervical fascia in its natural state is thin, but even in this condition, it is more resisting than its texture would lead us to suppose. To see it where it is really an object of interest to the surgeon, we must contemplate it where thickened by the pressure of tumours formed beneath it. If we do this, we shall be convinced, that both it and the platysma myoides perform the office of fasciæ, and we shall at once be satisfied that the neck, so far from being without a fascia, is provided with a double sheath; a fact which cannot be too firmly impressed on the mind of the student. It will lead him to form a just estimate of the nature of some diseases, and will assist him

in explaining the causes of particular symptoms. Nor is it sufficient that it be known that the neck is invested with a fascia; there are likewise peculiarities in its mechanism, at different parts, which must be pointed out.

The fascia of the neck descends from the lower edge of the maxilla inferior, and is thinner at the front than at the angle of the jaw. At that part, a fold of the fascia is tucked back to the styloid process, to which it adheres, and here it is incorporated with an aponeurotic expansion from the pterygoid muscle, forming the ligament of the jaw. This ligament may readily be felt, chord-like, extending from behind the angle of the jaw backward and downward. It is rendered distinct, by bending back the head, and inclining it to the side opposite to the one we are to examine. In emaciated bodies, it forms a stringy line, which seems to be lost about the anterior margin of the sterno-mastoid muscle. The fascia, as it descends along the neck, dips down among the muscles and glands, forming capsules for the latter. These are productions from the inner surface of the fascia, in the same way that the falx is a production from the dura mater. On its outer surface the fascia is pretty smooth, and it is nearly of uniform thickness in every part below the os hyoides, till it comes to expand over the pectoral muscle, when it puts on more of a cellular appearance. At the lower part of the throat, there is some peculiarity in

the mechanism of the fascia. When the integuments are dissected off, the fascia, which has been described, is brought into view, covering the sterno-mastoid muscles, and extended between their tendons. By dividing this fascia, a mass of fat, equally thick as the upper bone of the sternum, and often having imbedded in its substance a small conglobate gland is brought into view. When these are cleared away, another layer of firm, tense, and fibrous fascia, is exposed covering the outer surface of the sterno-hyoid and thyroid muscles. By pulling the superficial fascia, the deep seated one will be seen to be derived from it. Where the fold from the superficial fascia is inflected along the upper end of the sternum, it is greatly strengthened by the crossings and bindings of strong tendinous fibres. The deep fascia over the sterno-hyoid muscles, is much stronger than the superficial fascia; indeed it forcibly resists any effort to push the finger through it into the chest. It likewise prevents the finger being pushed from the chest higher than the lower edge of the thyroid gland. These are facts which I would wish to impress on the mind, for they are highly necessary to be remembered. The first will assist us in explaining the use of these fasciæ and muscles, while the second leads to an illustration of some morbid phenomena.

From what takes place on the removal of the superficial and deep fasciæ, accompanied with

destruction of the sterno-hyoid and thyroid muscles, we learn the value of them. So long as these remain entire, breathing is performed with ease, provided there be no disease in the lungs, or neighbouring parts; but whenever these fasciæ and muscles are removed, then, on every attempt to increase the size of the chest, the atmospheric air pushes back the unresisting skin on the trachea, compressing that tube to such a degree, as to occasion very serious difficulty in breathing. The sterno-hyoid and thyroid muscles are capable of steadying the hyoid bone and thyroid cartilage, or of depressing these parts; but their great use is to co-operate with the fasciæ, in preventing the gravitation of the air on the windpipe. That this is a correct account of their office, will be illustrated by the following case, which was, some time ago, under the care of Dr. Brown, by whose kindness I had an opportunity of seeing the patient, and taking a cast from the parts. The gentleman was between twenty and thirty. He had the hooping-cough when three years of age; the disease was pretty severe, and ever afterwards he experienced some difficulty in breathing, but till within these few years, there was no external mark of disease. About that time he perceived a fulness and tension just above the sternum, which increased during three months, when the integuments burst, and a quantity of fluid was discharged. The ulcer soon put on a decidedly

scrophulous appearance, and from it the patient drew out from between the laminæ of the mediastinum, a portion of lymphatic substance about three inches in length. Soon after this the sore began to skin over, but without restoration of the lost substance. After the opening was completely closed, the trachea, the arteria innominata, and the thyroid branch of the lower thyroid artery, were found to be covered merely by a very thin pelicle of polished skin,—a defence not sufficient to prevent the pressure of the air on the trachea; consequently, whenever this person, by increasing the size of the chest, forms a vacuum in the trachea, the air passes in its canal in part by the rima glottidis, but it likewise endeavours to force its way directly above the sternum. The fasciæ and muscles being destroyed, the mechanical pressure of the atmosphere compresses, to a certain degree, the canal of the windpipe.

On this case I would remark, that there is reason to believe, that the irritation excited in the thorax, during the hooping-cough, had begun the disease in the thymus gland, which had continued slowly to increase, till, at last, an abscess formed in it. If this be a correct supposition, we learn why the breathing has been uniformly difficult from the time he had the hooping-cough, even to the present day. Previous to the formation of abscess in the gland, it is probable that it had been enlarged, and that it had, by its mechanical

pressure on the trachea, produced dyspnœa.—After the healing of the ulcer, which, in its progress, had destroyed both the fascia and muscles, no one can wonder that there should be great difficulty in breathing. The destruction of these parts, and the matting about the top of the chest, afford a satisfactory explanation of the cause of this. By the loss of the former, the resistance to the air being removed, there is at each time that the patient inspires, a deep hollow formed at the upper part of the sternum, and a wheezing sound is produced by the passage of the air along the narrowed trachea. I have often thought, but have had no opportunity to put it to the test of experiment, that by artificially supplying the lost parts, we might alleviate the difficulty of breathing. This might be done by applying a piece of leather, spread with adhesive plaster, over the lower part of the neck, taking care to place it there while the patient was in the act of expelling air from the lungs. By pressure with the hand, it might be retained in a proper situation, till it was so fixed as not to be forced back by the atmosphere. To prevent the starting of the edges of the leather, and the insinuation of the air between the skin and the plaster, they might both be brushed over with a solution of sealing wax in alcohol, as recommended by Mr. Abernethy after operations on the knee joint.

The structure of the fascia and muscles is next to be attended to, as illustrating disease. The thymus gland, which is in a manner peculiar to young animals, is lodged between the layers of the anterior mediastinum immediately behind the sternum, and lying over the forepart of the arch of the aorta, the roots of its primary trunks and the subclavian vein, between which and the spine, the trachea and œsophagus are placed.

This gland is apt to enlarge in those of a peculiar habit, and its position is such, that whenever it begins to swell, it occasions most serious uneasiness. On the front the tumour is prevented by the sternum from protruding outwardly; above the sternum, the fascia and muscles repress its growth; as it enlarges, therefore, it must press backwards on the important parts which are between it and the spine. No wonder, then, that the patient should in the end, die from suffocation and starvation. Even what food passes into the stomach, fails to nourish the body properly. The pressure of the tumour on the subclavian vein, interrupts the entrance of the chyle into the heart, and thence the mesenteric glands are, in such cases, generally found enlarged and obstructed. In three children who had died from disease of the thymus gland, I found the lacteal gland increased in size *.

* There is no doubt that marasmus of the system is generally present in those cases, where the thymus gland is affected with the enlargement

As this disease generally occurs in children of a scrophulous constitution, I have repeatedly prescribed muriate of lime, burnt sponge, and the other remedies usually employed in that disease, but have never seen them of advantage. I have witnessed decidedly good effects from repeated blisters and long continued friction, but even these seldom do more than merely alleviate, and that only before tabes mesenterica has been induced.

When topical and internal remedies have failed, it is practicable, although many may be inclined to think not prudent, to remove the gland.—Where the thymus is so much enlarged as to give rise to serious symptoms, a fulness and swelling is felt above the sternum, where it is only covered by the fascia, and sterno-hyoid and thyroid muscles. After death I have twice removed the tumour. To do this, I made an incision on the front of the neck, just above the sternum, and between the sterno-hyoid muscles, as in the opera-

described in the text, but the explanation of the cause of this emaciation given by the author, is by no means satisfactory. I have dissected many cases of this disease, and have never met with one in which the transverse vein had become obliterated. But, even allowing that the pressure of the tumour did close that vessel, still its blood mixed with the chyle, would enter the circulation by anastomosis. It is probable that the tabes mesenterica, and the disease of the thymus gland, commence at the same time, and originate from the same cause,—a scrophulous disposition of the system. If this opinion be correct, the operation recommended for the removal of the thymus gland, although it might relieve the dyspnœa, could in no case restore the patient to health; the diseased enlargement of the mesenteric glands remaining, would speedily destroy life.—Ed.

tion of tracheotomy. By this cut, the rounded knob of the diseased thymus was exposed. Having done this, I next insinuated the fore finger between the gland and the adjacent parts, till the former was insulated so far as I could reach. After this, by a pair of polypi forceps, cautiously introduced between the mediastinum and the gland, I grasped the tumour, and wrenched it from its connexions. This, on the living subject, would be a most dangerous operation, yet where death is otherwise inevitable, it might perhaps be warrantable to try it. I think, that were it cautiously executed, injury of the large vessels might be avoided, and the sponge would easily command any bleeding which might take place from its own nutrient arteries; an event which is hardly possible, if the tumour be pulled away. Some may suppose, that inflammation would be apt to follow this operation, but this is to be little dreaded; the debilitated state of the patient will be a sufficient security against its occurrence.

It has been mentioned, that one or more conglobate glands generally lie imbedded among the loose fat and thready cellular substance which occupies the space between the two plates of fascia. Where these glands enlarge, they form a tumour, in many respects resembling a diseased thymus, but by attention, the one disease may be easily distinguished from the other. Enlargement to the same degree of the thymus, would be

productive of most serious dyspnœa, but swelling of the lymphatic gland, although productive of difficulty in breathing, does not, till very large, endanger the life of the patient. Besides, by examination, it can generally be ascertained, that such a tumour is unconnected with the chest. My friend, Dr. Gordon, Lecturer on Anatomy and Physiology in Edinburgh, very lately met with an instance of enlargement of this gland, in a patient who had died from tetanus. Mr. Cruikshanks saw a fatal case of this disease. As the tumour is exterior to the deep fascia and muscles, there can be no reason why it should not be extirpated; it is not connected with any vessel or nerve of importance, and can, on cutting into its capsule, be easily started from its seat.

Besides these glands, there are many other conglobate glands about the neck and throat. Of these, some lie more superficial, and others deeper seated than the fascia. This, therefore, leads to a natural division of tumours about the throat, into those which are covered by the fascia, and into those which lie exterior to it. This is a distinction of practical importance. Tumours by being placed more superficial, or deeper than the fascia, are modified in their complexion, varied in their effect, and more or less difficult in their removal. As may naturally be supposed, those tumours which form exterior to the fascia, are superficial, moveable, and as they enlarge, spread laterally,

and even when of great size, are comparatively easily extirpated. They are circumscribed, elevated, and for a length of time, by grasping them, we can pull them so far outward, as to allow, in some degree, of the insinuation of the finger between them and the parts behind.

It is of consequence to extirpate such tumours, so soon as we have ascertained that they are of a nature requiring removal, for although they at first lie exterior to the fascia, yet in the progress of their enlargement, they press on this sheath, producing thickening and adhesion of it to themselves, and the parts below; or at other times the pressure is productive of absorption of the interposed layer of fascia, after which the tumour, as if it had originally been placed beneath the fascia, dips backward, and contracts adhesion to the deeper and more important parts. These tumours do not, however, invariably produce either of the effects described. Sometimes even where very large, they remain free from adhesion to the parts behind.

A man, ten months ago, while in the West Indies, observed a small moveable tumour at the angle of the jaw, not larger at first than a horse bean, and productive of very little inconvenience. As it evidently continued to increase, he was advised to leave the country, in order to get the diseased parts extirpated in a colder climate. With a view to this he came to Glasgow. When

I saw him, the tumour was about the size of the head of a new born child, was situated over the lowest part of the parotid gland, and over the sterno-mastoid muscle, was regular on its surface, elastic to the touch, and only painful at one particular spot, unless when pressed on, at which time he complained of a diffused, although not acute pain, over the whole extent of the tumour. It neither gave rise to inconvenience in breathing nor swallowing, nor impeded the motion of the jaw, and when grasped between the fingers, it could be pulled out from its attachments behind; a clear proof that it was still unconnected with any part which would render its extirpation hazardous.

This tumour, I have no doubt, originally arose from enlargement of one of the subcutaneous lymphatic glands, and I believe that it will generally be found, that such swellings, from the small quantity of interstitial fluid which they contain, are firm and unyielding, or only slightly elastic. They are commonly called wens; when cut into, they appear as if composed of a mixture of cellular membrane, and intervertebral substance. They are very indolent, have few blood vessels, and very few fibrillæ of nerves can be traced into their substance; of consequence, they are torpid, and even when large, produce only a dull heavy sensation, not generally amounting to pain. Such tumours seldom suppurate,

but sometimes by their irritation, they excite inflammation in the parts with which they are in contact. This deprives them of their due supply of blood, they die, and I have seen the body of the tumour when the skin which covered it gave way, cast off as an extraneous substance. In this way a natural cure is sometimes accomplished, but it is a rare occurrence. Where the tumour is neither extirpated, nor otherwise destroyed, it continues progressively to increase in size; and often when it has continued for a length of time, its vessels assume a new mode of acting, they form a pretty solid substance, sometimes cartilaginous, and at other times osseous.

Mr. Travers, Demonstrator of Anatomy in Guy's Hospital, writes me, that Mr. Astley Cooper, some time ago, extirpated three large tumours of this kind, from about the angle of the jaw. In his cases, the tumours began just below the zygoma, they descended considerably lower than the angle of the jaw, and extended forward till they reached the spot where the fascial artery makes its turn over the jaw, and posteriorly they included the lobe of the ear. They were, as Mr. Travers observes, in their external features, such as would generally deter country practitioners from interfering with them. Their extirpation is extremely simple, they have seldom, even when large, above a single artery of such a size as to require a ligature, entering into their sub-

stance. The veins, however, belonging to the tumour are often varicose, so that when divided, they pour out a considerable quantity of blood.—This is the only inconvenience which generally attends the extirpation of such tumours.

In extirpating a tumour of this kind, it is advantageous not to leave too much skin. Where, therefore, the swelling is large, even although the integuments be not diseased, a portion of the skin must be removed by an elliptical incision. Then, by dissection, the whole extent of the tumour to its base, is to be fairly exposed, after which, it is to be grasped with the left hand, and pulled outward, while, with the scalpel, its cellular connexion with the fascia is to be divided. Where the tumour is small, it is preferable, when the whole of it is uncovered, to grasp it firmly between the fingers, and suddenly, with a twisting motion, wrench it from its place. This possesses several advantages over the use of the knife; we do, indeed, occasion a more pungent pain by the former, but then it is of less duration, and we seldom or never have any bleeding from lacerated vessels.

I have seen a subcutaneous tumour over the parotid gland, when not larger than a walnut, by its pressure, produce absorption of a part of the parotid, by which it made a bed for itself in the substance of the gland. In such a case, it is evident that it would be very difficult to dissect

away the tumour with the knife, without, at the same time, injuring the parotid, which is avoided by tearing away the tumour with the fingers.

After the tumour has been taken away, the edges of the wound are to be brought accurately together, and retained in contact by strips of adhesive plaster. Sutures, so much employed by the older surgeons are now justly laid aside, as they generally retard the cure. It is not only necessary to keep the lips of the wound in contact, the skin must also be supported, in connexion with the parts beneath, by means of a compress, retained in its situation by a proper bandage.

Tumours beneath the fascia are more frequent in their occurrence, than those exterior to it, and are much more dangerous in their nature. Such tumours are firmly bound down by the fascia, they are flattened on their surface, are consequently large before they protrude externally, and are intimately connected with the deep seated parts. They produce greater effect on breathing and swallowing than would be expected, from their apparently small size. Indeed, the extent of their adhesions can hardly be discovered, because although they be small and regular on their outer surface, they often stretch back amongst the muscles and vessels, and adhere to the large nerves. Where, therefore, a tumour is deep-seated, is of a specific nature,

and is evidently on the increase, there can be no doubt, that if other circumstances be favourable, it ought, without delay, to be removed.

In the neck, even simple tumours may require extirpation, because, if they do not yield to medicine, but, on the contrary, continue to enlarge, they, in the end, come to compress the trachea and œsophagus, by which, ultimately, they will produce as much mischief, as if they had been of a specific nature. About the throat there are many muscles which leave interstices between themselves, and there are many primary branches of vessels and nerves interwoven with these muscles, which all become intimately concerned with tumours here.

From the resistance afforded by the platysma myoides and the fascia, such tumours penetrate between the contiguous muscles, and encircle the subjacent vessels and nerves, rendering, where the disease is advanced, the excision of these swellings peculiarly perplexing to the surgeon, and dangerous to the patient. Indeed, there are many tumours formed in the region between the chin and the chest, to attempt the removal of which would, on the part of the operator, betray the grossest ignorance of the structure of the neighbouring parts. Some tumours are so deeply attached to the pharynx, are so intricately entangled among important arteries and nerves, and so firmly fixed

to the muscles in the vicinity, that to undertake their extirpation would be to form the resolution to injure all these parts.

This establishes most forcibly the propriety, nay, it proves the absolute necessity, of as speedy a removal of the morbid parts, as is compatible with prudent attempts to remove the tumour without operation. If distant parts have suffered from an extension of the morbid action, no one can be certain that all the diseased substance has been cleared away; and if a single atom of the contaminated parts be permitted to remain, the patient is in a condition equally dangerous as before we operated. The disease is suspended, not eradicated, and the secondary affection is worse than the first.

A useful distinction of tumours might be formed, were we *a priori* able to determine their structure, by dividing them into such as depend merely on a preternatural deposition of particles, resembling in texture the original structure of the part; and into such as depend on an increase of size, produced by a change of the natural organization. It will be found that the first species is generally indolent, and little prone to inflame or ulcerate, except when teazed and irritated by improper treatment. The second species from the very nature of their constituents, are liable to inflame, and either sphacelate, fungate, or ulcerate.

Mr. John Bell maintains, that, originally, every tumour is produced by an excess of healthy nutrition, and he would persuade us, that ultimately the parts are modified " in form and character, by many changes produced by occasional inflammation or ulceration." One would hardly have expected such an assertion from a surgeon, who would make us believe that he had traced the nature and properties of these morbid productions from their simple beginnings to their final termination. Shall Mr. Bell convince any one, that in cancer or scrophula, the tumour was, in the first instance formed of healthy parts; but that, eventually, the swelling obtained the peculiar character belonging to these different affections, " by occasional inflammation or ulceration?" I should be sorry to waste time in animadverting on this conjecture, were it not that, to me, it appears a point highly requisite to be well ascertained. It must be the regulator of our practice. If primarily every tumour be simple, then the whole art of the surgeon must consist in keeping it simple. His object must be to avoid the induction of " occasional inflammation or ulceration."

There is in this hypothesis nothing precise, and nothing really useful; but if admitted, there is much positively hurtful, as it will lead to a timid and procrastinating practice. It would, therefore, be a most desirable object with the surgeon to become acquainted with the criteria, by which he

would be enabled to distinguish those tumours which were of a specific, from those which were of a simple nature. Were this practicable, he would be able, in almost every case, to cure the patient; for in the incipient stage, few tumours, in comparison of the many which occur, are so placed as to prevent his extirpating them. But, as in the present state of our knowledge, we have it not in our power to do more than form a rude notion of the nature of swellings, we often mistake a specific for a simple tumour, and waste time in useless endeavours to promote its removal without an operation. We, in fact, allow it to acquire such a size, and to form such connexions, that when we become convinced of its intractable disposition, it is no longer optional with us to take up the knife with any reasonable prospect of success.

With more zeal than success, Mr. Abernethy has endeavoured to arrange tumours according to their textures, but his plan is liable to this great objection, that we can, for the most part, only discover the real nature of the parts by actual examination. That Mr. Abernethy has failed to communicate criteria, by which we may generally estimate the nature of tumours in the living patient, is indisputable; yet, let it not be imagined, that I would insinuate that this is to be imputed to any insufficiency on his part for the execution of the task he has undertaken. On the contrary,

all must allow, that the facts, as yet collected, respecting tumours, are too limited, and our information respecting morbid structure, is too vague, to enable any one to form, on a solid basis, a classification of tumours which shall be eminently useful to the practical surgeon. It is well known, that tumours essentially different in their nature, present externally similar features, which renders futile any attempt to classify such morbid productions.

After these remarks, it would be folly in me to offer any other than a few very general observations on tumours, reserving the considerations regarding the extirpation of these, till after I shall have pointed out the relation of parts about the neck, and attended to the local connexions of the numerous variety of tumours which form in the region of the throat.

From the high importance of the vessels and nerves about the neck, it becomes the duty of the surgeon, in every morbid condition of these parts, to inquire into the cause of the disease, to ascertain carefully, whether it be a primary, or a secondary affection; and if secondary, whether it be sympathetic, or dependent on absorption of a specific morbid poison. If it be clearly ascertained to be a primary affection, then it is necessary to investigate the origin, the progress, and the existing state of the tumour, to enable us to decide justly, as to the propriety of

allowing it to remain, or to determine on its immediate extirpation.

It is not in primary affections alone, that the surgeon is sedulously to trace the progress of the disease; he is called on to be equally careful to make himself acquainted with the causes of secondary tumours. But here it is to be remembered, that the field is less extended; if the primary disease be simple, the secondary must be so also, and *vice versa*, where the latter swelling is dependent on absorption. Where, however, the primary tumour has not proceeded to ulceration, we may hesitate regarding the nature of the secondary; we may suspect that it is merely sympathetic.

Facts connected with the history of tumours, render it probable that the lymphatic glands never do become specifically contaminated, previous to the formation of an ulcer, or a fungus in the part primarily affected; but earlier than this, we know that they often swell from sympathetic connexion with the morbid parts. This we sometimes see exemplified in carcinoma of the breast, accompanied with enlargment of the axillary glands. These tumours occasionally disappear after the removal of the mamma, which clearly shows, that they were not dependent on specific contamination.

Although I have stated that it is probable that the absorbent glands are never specifically

contaminated, till the primary disease has proceeded to ulceration, or to the formation of the fungus, yet I am not ignorant, that some are of a different opinion. It has, indeed, been conjectured, that there may be specific irritation, as well as specific absorption, but this is a doctrine which ought not to be admitted, without complete proof of its accuracy; a proof, which on this point is still a desideratum.

As I would wish to be perfectly understood on this subject, I may mention, that we are by no means to infer, that a secondary tumour is sympathetic, merely because the primary one has not ulcerated externally; this is really no proof. After the removal of the latter, we are carefully to examine, whether there be any fungi, or ulcerated points in its centre. If these existed, I would incline to the belief that the secondary tumour was specific, and would, therefore, without hesitation advise its removal; but if after a minute inspection of the primary tumour no traces of fungi or ulceration could be perceived, I do not know how far it would be adviseable to extirpate the secondary.*

* The editor's observation on the subject of tumours, which has been considerable, lead him to differ from the opinion expressed by Mr. Burns, as to its being necessary that ulceration or fungus shall have taken place in the primary affection, before the secondary one can become specifically contaminated. In many instances where the most accurate and minute dissection has been unable to detect, in the original tumours, either incipient ulceration or fungus, the structures of those which have arisen secondarily have been found to present the same characters of their being of a specific na-

Our great object, therefore, and our chief inducement to distinguish those tumours about the neck, which originate from simple irritation, from those which are dependent on specific contamination, is with a view to regulate our proceedings. If we incontrovertibly ascertained, that the tumour was of a specific nature, we would, without delay, extirpate the diseased parts. Where, however, we were uncertain, we would be less decided in our conduct. In doubtful cases, there is an obvious motive for delay. While there is a probability that the tumour is simple, we may succeed in removing it without an operation; but, in specific tumours we have no such inducement, —procrastination will only permit the disease to gain ground.

These general observations show, that there is much uncertainty in the diagnosis of tumours about the neck; some being produced by simple irritation, which, to one who satisfied himself with a superficial inquiry into the case, would seem to be induced by the absorption of specific virus, while others really of a specific nature, are, from the indolence of their actions, supposed to be simple; and under this impression, are

ture, as those exhibited in the primary affections. The rule of practice which his experience would induce him to inculcate, would be, in every case, before performing an operation for the removal of a tumour supposed to be of a specific character, to examine carefully those glands, which receive their lymphatics from that situation, and should any of them be found enlarged, to remove them at the same time that we extirpate the primary tumour.—Ed.

allowed to remain and extend their connexions, till they get beyond the reach of surgery. This want of well defined character in the early stage of the disease, is a source of great ambiguity. I have thus known a small tumour of the spongoid species, which, when the patient first applied for assistance, could have been easily and safely extirpated, left for months, gaining ground daily, plunging deeper and deeper, becoming more and more intricately attached to the parts in the vicinity, during all which time the woman was teazed with burnt sponge, muriate of lime, and repeated blisters; remedies which are well known to have no control over that disease.

At last, when the character of the complaint became so decided, that no one could mistake it, the surgeon consoled himself, that now the tumour had extended too far to permit of extirpation; that to attempt this, would be to form the resolution to destroy the patient. This is, however, at all times a poor excuse, especially when the practitioner is conscious that the malignancy of the disease depended, in a great measure, on his own procrastination and want of knowledge.

Tumours in any part of the body, are of a nature to require the most prompt and decided practice, but our vigilance must be doubled, when the morbid parts are seated in the vicinity of large vessels and important nerves. I have

known one surgeon, after much unnecessary delay, undertake to remove a tumour from the neck, but I may safely venture to affirm, that the same gentleman will be in no hurry to begin a similar operation.

When the tumour is decidedly of a simple nature, the object of the surgeon plainly is, to promote the absorption of the newly formed parts; but where he fails to accomplish this, he next attempts to induce suppuration. In primary tumours, however, as it is often difficult to discover the real nature of the disease, we necessarily act on an uncertainty. Yet, in all doubtful cases, I think we are authorised to use means to procure absorption of the morbid parts; but it is by no means so clear, that in such cases, we are, after these have failed, to delay endeavouring to induce suppuration, since this event would only be useful in tumours of such a nature, as not to require extirpation, unless from their mechanical effect on some neighbouring and highly important part. In simple swelling, we are, however, to the latest, to continue our endeavours to promote absorption, or to procure suppuration; for if we can succeed in effecting this, all danger is comparatively at an end. The patient, when the abscess bursts, or is opened, is placed beyond the reach of immediate risk, and time is afforded to the surgeon to suit his plans to the nature of the case.

After the description of the fascia, and the general remarks on the modification of the characters of tumours by that sheath, it will be necessary to attend to the anatomy of the lower and lateral part of the neck. We must trace the connexions of the subclavian arteries at the root of the neck.

From their origin, these arteries mount upward, and incline outward, and are covered, till they reach the scaleni muscles, by the sterno-mastoid muscles. Between the aorta and scaleni muscles, the subclavian artery is connected with several important vessels and nerves. It is in the vicinity of the nervus vagus, of the recurrent laryngeal nerve, of the sympathetic nerve, of the phrenic nerve, and the subclavian vein; and on the left side it is intimately connected with the termination of the thoracic duct. These parts are all grouped together in a very narrow space, and the perplexity of their dissection is further increased by the interlacement of the different nerves with one another.

The natural connexion of these parts are best shown by merely raising the sternal extremity of the sterno-mastoid muscle. If this be done, the nervus vagus will be brought into view, lying on the fore part of the subclavian artery, almost directly behind the sternal end of the clavicle; and exactly opposite to the nervous vagus, but

behind the artery, the lower cervical ganglion of the sympathetic nerve will be brought into view. The recurrent nerve on the right side, hooks round the subclavian artery, and in its course towards the larynx, ascends along the tracheal side of the sympathetic nerve. On the left side it twines round the arch of the aorta, and in mounting upward, is interposed between the subclavian artery, and the œsophagus. The subclavian vein lies anterior to the artery, and in the collapsed state, sinks nearer to the thorax.

This is its usual position in the dead body, but in the living person its relation to the artery is constantly changing. Alternately it is flaccid and full; in the first state it bears the same relation to the artery, as in the dead subject; under the latter circumstances it swells out quite tense, and ascends, so as in some measure, to overhang and conceal the artery. The thoracic duct enters the left subclavian vein about an eight of an inch nearer to the acromion, than the point where the internal jugular vein empties itself into the subclavian vein. The termination of the thoracic duct is situated between the sternal and clavicular portions of the sterno-mastoid muscle.

I have been thus particular in the description of the parts connected with the subclavian artery, between its origin and the scaleni muscles; because, one who knows their position, and is aware of their importance, will correctly estimate the risk

of attempting to tie the artery nearer to the heart than the scaleni muscles. It will also impress on the mind of the surgeon, the great danger of extirpating tumours from behind the root of the sterno-mastoid muscle. Our ancestors, who were very deficient in anatomical knowledge, had the sense and modesty to decline any very hazardous operation. In the present age, timidity forms no part of the character of the generality of surgeons. But in operating, something more than boldness is required; knowledge, prudence, and caution, are requisite.

In tying the subclavian artery nearer to the heart than the scaleni muscles, there is not only considerable risk on account of its connexions, but there is even much danger to be apprehended from confounding aortic aneurism, with aneurism of the subclavian artery. It would be doing injustice to Mr. Astley Cooper, were I to omit mentioning, that to him I was first indebted for the communication of this fact, which I had lately an opportunity of seeing verified in a most striking and highly interesting case,—a case on which several of the most distinguished practitioners in Edinburgh, and almost every surgeon in Glasgow, were consulted.

The nature of the disease appeared to be so decided, and its situation in the subclavian artery so clear, that on that subject there was no difference of opinion. Some were, however, of opinion, that

an operation might be performed, while others were fully convinced that the case was hopeless. For myself, I must confess, that I was firmly persuaded, that in the early stage of the disease, an operation might have been beneficial; those who dissented, did it on the belief that the aneurism was seated so near to the origin of the subclavian artery, that to get beyond the limits of the disease, the ligature must have been passed round the arteria innominata itself,—an operation, said they, for which there was no precedent, and which there was much reason to suppose would fail. Those who approved of it, did so, on the ground that death was inevitable, if the disease was left to run its course; that if an operation was performed, the most which was ever expected was, that by cutting off the direct current of blood through the sac, coagulation of its contents might take place. To the occurrence of this event, and of this event alone, a favourable issue, if it did take place, must have been attributed.

The great objection which we had to the experiment, was the uncertainty with respect to the state of the coats of the arteria innominata; we entertained no dread of the circulation being supported in the right arm, nay, we reduced it to a demonstration. On the dead subject, I tied the arteria innominata with two ligatures, and cut across the vessel in the space between them,

without hurting any of the surrounding vessels. Afterwards, even coarse injection impelled into the aorta, passed freely by the anastomosing branches into the arteries of the right arm, filling them and all the vessels of the head completely.

After these remarks, I shall, without alteration, transcribe the history and progress of the disease from my case book:—"On Friday the 13th of October, 1809, I was requested to visit an officer belonging to one of the regiments in town. He had risen from the ranks, and had, till about that time, been an able, active, and useful soldier. He had been engaged in very laborious service in India, and while in that country, he had been confined by an affection of the liver, which had produced a depression of his spirits, from which he had not fully recovered at the time I saw him. When I visited him he was ailing, but felt difficulty in defining his complaints,—he told rather what he had not, than what he actually had. A few weeks ago, he supposed that his left arm felt benumbed, and nearly about the same time, he experienced some unpleasant sensations about his head.

"Till Sunday last, however, he was not supposed to be seriously unwell. On the afternoon of that day, while travelling at an easy rate in a post-chaise, he was suddenly seized with a very acute pain over the uppermost rib, on the right side,—

a pain which extended even to the top of the shoulder. This pain was so much increased by the motion of the carriage, that he was compelled to quit it, and finished his journey on foot. He walked about two miles. On his arrival in town, he was led to examine the pained part, where he discovered for the first time, a firm pulsating tumour, which alarmed him very much. When I saw him, which was at the request of the practitioner who had already visited him, he had an anxious, though by no means an unhealthy look. He complained of little present inconvenience from his complaint, except pain, stretching from the root of the neck towards the back; but he dreaded the result of his disease, the nature of which he had discovered.

"A tumour about the size of a pigeon's egg was situated just behind the clavicle, and on the acromial edge of the sterno-mastoid muscle. It pulsated strongly, while the radial artery of the right arm acted with little vigour; but on comparison with the artery of the opposite arm, the pulse was stronger. In both arms the pulse was regular, when I examined it, but during the two preceding days, I was informed that it had been intermittent. In regard to the tumour itself, it was placed in part beneath the clavicular portion of the sterno-mastoid muscle, but the greatest part of it lay nearer to the acromion than the muscle. By pressure the tumour could be nearly

emptied, but while doing this he complained of considerable uneasiness. So soon as the pressure was removed the sac became again distended, and the blood in entering it communicated a whizzing sensation to the finger. The impulse was at the same time great, and on the contraction of the ventricle, the sac became exceedingly tense, and the throbbing, and whirlpool-like motion of its contents, were conspicuous features of the disease. The arteria innominata was felt beating at the top of the sternum, apparently in no degree enlarged. The common carotid acted more feebly than on the opposite side. The skin was free from discoloration, and his rest was unbroken.

"On reviewing this case, we had no doubt as to the nature of the disease, indeed its character was too decided to be mistaken. We earnestly wished to be of use to him, and he declared his readiness to submit to any operation. Yet who could urge an operation in such a case?—What certainty was there that the coats of the arteria innominata were not diseased, even to where that vessel arises from the aorta? The immediate risk of operation would have been immense, it would probably have accelerated the fatal issue, which he was directed to retard by low diet, by abstinence from wine, spirits, or fermented liquors, by keeping the bowels most easy, by avoiding either corporeal exertion, or mental irritation,

and by employing digitalis to moderate vascular action.

"I had occasional opportunities of seeing the patient, but, till toward the end of December, there was little change on either the tumour or general health, if we except a tendency to œdema and depression of the spirits. The former was completely removed by the use of digitalis. On the 28th December, I found the tumour much flattened, and could perceive very little pulsation about the arteria innominata. Along the subclavian, vertebral, and common carotid arteries, there was a peculiar thrilling sensation during their action. He has now frequent paroxysms of pain, extending along the right side of the head, and complains of constant numbness of the left arm.

"The food he takes is light, his bowels are easy, but he is weaker and more anxious than before. The pulse is nearly similar at both wrists. On one occasion, he lately felt a sudden rushing of blood to his head, followed for a short time, by dimness of vision.

"January 27th, 1810.—The tumour is no larger, but it is flatter, broader, and fully more incompressible. It now extends to the very tracheal edge or the sterno-mastoid muscle, but appears, as yet, to make no pressure on the aspera arteria. When the sac is squeezed, he complains of a sharp pain extending round the shoul-

der. The jarring action of the subclavian and carotid arteries is not so well marked as before. The pulse in the right arm is sunk and feeble, the numbness of the left is less, but the right hand has of late become slightly œdematous. He has coldness of the feet, vertigo, and feeling of blood at times rushing into his head. His general appearance is somewhat improved, but his spirits are very much depressed,—he is weak, and feels fully persuaded, from his sensations, that the disease is extending into the chest. One of the perforating arteries, from the internal mammary vessel is distinctly felt enlarged.

"March 23d.—Till yesterday there was very little alteration in the size of the tumour, and almost no change in the constitutional symptoms. The right arm had slowly lost its power, the hand remained permanently of a purplish colour, and was sometimes œdematous. When he walked the swelling became tense, and by its distension produced pressure on the veins, returning the blood from the head, occasioning vertigo, failure of sight, and turgescence of the veins of the head and neck,—symptoms which soon abated after desisting from exercise.

"Yesterday, a short time after dinner, which consisted merely of bread and water, the tumour suddenly became greatly increased in size—not only projecting farther out, but extending laterally in every direction, except towards the tra-

chea. The clavicle appears to be forced away from the sternum, and pungent pain is occasioned by even gentle pressure on either the tumour or right side of the neck. But it is rather curious, that he felt little pain during the sudden enlargement of the sac,—he had, at that time, rather the sensation of something giving way or yielding. The integuments covering the sac are now slightly discoloured, and obscure pulsation can be discovered in the upper part of the right side of the chest. The pulse in the right arm is rather more distinct, yet it is less so than in the opposite arm. He has no actual difficulty in breathing, but he says that he is *short-winded.* The rest which he procures, is obtained by the employment of the ext. of hyoscyamus, and his bowels are kept regular by the daily use of stewed fruits.

"March 31st.—The tumour has increased considerably in size, and for several days past, his voice has been gradually impaired, and is now so much injured, that he can only converse in a low under tone, hardly audible. The sternal extremity of the clavicle seems partly absorbed.

"April 15th.—The tumour has considerably increased in size, and has extended toward the left side, but although it overhangs the trachea, he does not experience much difficulty in breathing; he complains, however, of some uneasiness when swallowing, and his voice is still weak and

raucous. He is disturbed with painful sensations about the left shoulder, similar to those he felt in the right about the commencement of the disease, and he is frequently distressed with palpitation, and feeling of failure about the region of the heart, accompanied with a tendency to syncope. His feet are still unusually cold, even when the rest of the body is warm. At one point the tumour is thin, projects into a small papilla, seated just on the acromial side of the sterno-mastoid muscle, and covered with delicate but not diseased skin. In other respects, he is much the same as formerly.

"October 10th.—I was requested to-day to visit the patient. His appearance and conversation were so much altered, that he hardly resembled himself; his face was œdematous, and streaked with purple veins; his right hand and arm were cold, lumpish, and anasarcous, and the cellular membrane of the lower extremities was loaded with water. He moved slowly, and held his head inclined forward. He spoke in a short and hurried whisper, interrupted every few minutes by a hollow cough, and profuse expectoration of greenish yellow matter. He had no pain; difficulty in breathing and want of sleep were his chief complaints. The aneurism was in no degree enlarged outwardly, the papilla-like projection had even disappeared, and its coverings were now much thickened; yet it caused

more pressure on the trachea, and from the very evident tremulous motion which I could perceive in the upper and right side of the thorax, I could not doubt the extension of the disease into he chest. The disease was now drawing to a conclusion; it neither admitted of alleviation, nor of being cured, and of this the patient was fully aware. He was not, therefore, disappointed, when I informed him that I had no remedy to propose. I left him with directions to send for me if he became worse.

"In four days we were called to inspect his body. The dissection, which was carefully performed, proved highly interesting. Appearances were presented, which, *a priori*, no one expected; the vessel which was supposed to have been most materially affected, was found perfectly healthy. The aneurism arose from the aorta, and included a considerable part of the arteria innominata. The right subclavian artery was only slightly dilated at its root; along its course, it was rather reduced in size. The tumour mounted from the aorta, considerably above the sternum, pressing in its ascent, the descending vena cava to the right, and the trachea to the left; obstructing thus the breathing, and intercepting the return of the venous blood from the head and arms. It also pressed the root of the right subclavian artery and the carotid against the spine, retarding in this way, the circulation along these

vessels. The trachea is so much displaced, that the left carotid slants across its front to reach the side of the neck. The right side of the heart is little affected; the left ventricle is much thickened, and the aortic valves are in part ossified, which, together with the obstruction to the circulation arising from the pressure of the tumour on the right carotid and subclavian arteries, will explain the increased strength of the muscular fibres of the ventricle. Just above the heart, the aorta is somewhat dilated; I say dilated, because its coats are healthy, and its canal free from lymphatic incrustation. This swelling terminates below the commencement of the arch. The inner surface of the aneurismal sac, was coated over with many layers of organized lymph, which coating was especially thick and strong about the highest part of the sac. The left part of the arch is of natural size, but a little below the commencement of the descending aorta, the vessel is again dilated into a small pouch. The œsophagus is pushed completely from behind the trachea."

The importance of this case, is the only apology I have to offer for its great length. It clearly and satisfactorily demonstrates, how serious the consequences would have been, had an operation been undertaken. It corroborates Mr. Astley Cooper's remark, that aneurism of the aorta may assume the appearance of being seated

in one of the arteries of the neck; an inference drawn from the examination of a case which came under his own observation, and of which he had the goodness to transmit a short history to me along with a sketch, illustrative of the position of the tumour. In our case, the aneurism was attached to the right side of the aortic arch, and involved a part of the arteria innominata; in Mr. Cooper's, the tumour arose from the left side of the arch, from between the roots of the left subclavian and carotid arteries. It formed a Florence-flask-like cyst, the bulbous end of which, projected at the root of the neck, from behind the sternum, and so nearly resembled aneurism of the root of the carotid artery, that the practitioner who consulted Mr. Cooper, actually mistook the disease for carotid aneurism.*

DESCRIPTION OF THE PLATES OF THESE CASES.

PLATE I. contains an anterior view of the aneurism described in page 62, et seq.

A A, the right and left ventricles of the heart.—B. the pulmonary artery.—C, the aorta, which is considerably dilated just above its origin.—D, the arch contracted to its proper size.—E, the aneurismal tumour involving the root of the arteria innominata, mounting up behind.—F, the sternum, displacing G, the clavicle,

*See Appendix, (A.)

the sternal extremity of which, is sunk into the coats of the sac, and roughened by partial absorption of its substance. Almost the whole of the cyst which projected above the sternum was filled, and rendered solid by different strata of buff-coloured incrustation. Toward the aorta, the lymphatic exudation was less copious, and more intermixed with coagulated blood.—H, the trachea pushed toward the left side, insomuch, that I, the left carotid artery, crosses it in a slanting course to reach the side of the neck.—The trachea is not only displaced; it is likewise reduced by the pressure of the tumour in its lateral diameter, and increased in its antero posterior, and K, the œsophagus, is forced completely from behind the windpipe.—L, denotes the little saculated dilatation of the descending aorta.

Had the tumour in its commencement, occupied the same situation which it did in the last stage of life, there would have been no hesitation in referring the disease to the arteria innominata. But it is to be carefully remembered, that in this very patient, the first appearance of the sac was nearer to the acromion than the sterno-mastoid muscle; at a point where no one would expect a tumour to be present, which had worked its way from within the chest. The gradual progress of the tumour, first toward the trachea, and then apparently into the thorax, tended still more to mislead, as to the real nature of the complaint. There was no wonder, therefore, that we should have been led to the belief, when we were first consulted, that the disease was seated nearer to the scaleni muscles, than the origin of the subclavian artery, and that this artery alone was in fault. An opinion which induced us to hint, that the arteria innominata might be tied, but the boldness of the operation, and the deficiency of data whereupon to estimate the probability of its issue, forbade us to urge the proposition.

As to the practicability of passing a ligature round that artery, we had no hesitation, and experiments made on the dead subject, convinced us that we had nothing to dread in regard to the arm being supplied with blood; but there was still another consideration, which we were entirely without the means of solving. We had no proof of the effects which would be produced on the brain, by suddenly cutting off the supply of blood from two of its vessels. We well knew that the circulation along the carotid artery, might be intercepted without detriment to that organ, but we possessed no testimony that both it and the vertebral artery might be tied with equal impunity. Yet, in so desperate a disease as aneurism of the subclavian artery, especially where it had a decided tendency to extend toward the chest, we thought it allowable to risk applying a ligature round the arteria innominata; we are still of the same opinion, but it is an operation which ought not to be rashly undertaken.*

I have related the present case as a warning to all surgeons; and I have to add, that in subclavian aneurism an operation ought never to be advised, unless where the fingers can be insinuated between the tumour and the chest, and even then the arteria innominata ought to tied, without any very sanguine expectations of success. There are many causes which tend to lessen the probability of this operation having the desired effect. In aneurism about the extremities, we can completely, or nearly completely, intercept the flow of blood through the sac. But in aneurism at the commencement of the right subclavian artery, tying the arteria innominata has no such control over the circulation. By passing a thread round that vessel, we may, indeed, very materially lessen the quantity of blood sent into the sac; but while the

* See Appendix, (B.)

common carotid and vertebral arteries remain unsecured, the retrogade circulation through the tumour must be considerable. Our only prospect of success, therefore, when we tie the arteria innominata, is founded on the natural tendency which the contents of the aneurism have to coagulation—a tendency which will be increased by rendering the circulation more languid, and which, perhaps, may ultimately transfer the circulation into a new channel. With this slender expectation we can alone undertake this operation. Some patients may prefer the chance of recovery it affords, to certain death from the extension of the disease; but no surgeon can conscientiously urge submission—that ought to be a voluntary choice of the patient, formed after a full and explicit acquaintance with the danger.

PLATE II. exhibits a posterior view of the same aneurism. It is intended to illustrate the way in which the arteria innominata A, is connected with the tumour, and how the sac extended upward between the right carotid artery B, and the right subclavian C, and the sternum by which both of these vessels were forced backward against the spine. In this view there is also represented the slight dilatation found at the root of the subclavian artery, and the contracted diameter of the vessel more remote from its origin. D, the vena cava superior, is seen squeezed and displaced by the tumour. E, the trachea, and F, the œsophagus, are both greatly displaced by the distension of the sac.

As the other parts of the engraving have little reference to the disease I shall pass them over without further notice.

Sketch III. I have added from the case which occurred to Mr. Astley Cooper. It is not to be considered as affording a representation of the actual appearance of the disease, it is merely a plan illustrative of the locality of the tumour A, which is seen arising by a very narrow neck from the arch of the aorta,

between the roots of the left subclavian artery B, and the left carotid artery C. It pushed up between these vessels, and appeared at the root of the neck, so that it resembled an aneurism of the carotid artery more than an aneurism of the aorta.

These Sketches are highly valuable, as they show the great difficulty in distinguishing aneurism of the aorta from aneurism of one of the large arteries. In the latter case, even if the disease had really been seated in the carotid or subclavian artery, no operation could, with any degree of propriety, have been undertaken. From the closeness of the connexion of the arteries at the root of the neck, on the left side, with the visceral nerves and the thoracic duct, it would be madness to attempt to pass a thread round either of them very near to the chest.

When the occiput is turned back, if we draw a line from the angle of the jaw to the spot where the clavicle touches the coracoid process of the scapula, and if we trace another from about half an inch behind the mastoid process to the acromial edge of the origin of the sterno-mastoid muscle, and extend another along the upper margin of the clavicle, a triangular portion of the side of the neck is marked, in which many important parts are lodged.

In cutting into this space, the skin and fascia require to be first divided and turned back. When this is done, the space itself is seen to be divided into two unequal portions by the posterior belly of the omo-hyoideus. The course of

this muscle is easily discovered on the living body, by drawing a line from the junction of the clavicle and coracoid process, to the sterno-mastoid muscle, two inches in the adult above the sternum. Above this line there is only lodged some small conglobate glands, some trifling branches of nerves, the arteria transversalis colli, and often the arteria cervicalis superficialis. Below it, nearer to the clavicle, there is found the subclavian plexus of nerves, and the great artery. The nerves at this part lie clustered and interlaced above and behind the artery.

It is in this confined space that the incision is to be made, and the artery detached from the nerves, when a ligature is to be passed round it, after it has passed from between the scaleni muscles; and it is here that tumours seated below the fascia are so dangerous to extirpate. They are then deeply nitched in and connected with parts with which we would not wish to intermeddle. This remark is only, however, applicable to those tumours which are formed beneath the fascia; those which are subcutaneous, circumscribed, and moveable, may even, when very large, be easily extirpated. When, however, any of the deep-seated glands enlarge, the tumour is formed behind the posterior belly of the omo-hyoideus muscle, is bound down by it and the fascia, continues for a length of time flat, and is long forming an external projection. At last it does

protrude outwardly, pushing before it the omo-hyoideus muscle, by which the acromial margin of the sterno-mastoid is turned forward, its clavicular portion is pulled up on the side of the tumour, and carried away from the sternal part. This position of the sterno-mastoid depends on the connexion of the omo-hyoideus with that muscle. Wherever, therefore, the sterno-mastoid is seen pulled over a tumour situated between that muscle and the trapedzius, the surgeon may be certain that it is deeper seated than the omo-hyoideus.

The position of the tumour, and the change produced on the course of the clavicular portion of the sterno-mastoid muscle, are very perfectly represented in an excellent cast taken by Professor Thomson from one of his patients. From this cast, I had, by his permission, a drawing taken, from which plate 4th, fig. 1. has been engraved. In this plate, A represents the clavicle, a little above which B marks the most prominent part of the tumour.—C denotes the clavicular portion of the sterno-mastoid, which, by the protrusion of the omo-hyoideus, is pulled away from the sternal part, describing a curve along the tracheal side of the tumour. The tumour, in this case, is braced back on the arteria transversalis colli, the arteria cervicalis superficialis, the upper series of the subclavian plexus of nerves, and on the posterior branch of the fourth pair of cervical

nerves. Had it been higher it would have been entirely unconnected with the large nerves, and had it been lower it would not only have been in contact with the subclavian plexus of nerves, but it would also have touched the artery.

In this triangular space, the tumour being covered by the fascia, renders it difficult to ascertain with precision its attachments. By the tenseness of the sheath spread over it, we are prevented from moving it fully from side to side, neither can we pull it from its bason. We may, however, in some degree, judge of its connexions, from its size, duration, and effects on the arm. Its adhesion to the branches of the arteries or nerves, can never be discovered, but we can generally ascertain whether it be connected with the large artery, or subclavian plexus of nerves. By grasping the swelling with the left hand, while we push the fore and middle finger of the right hand, deep behind the clavicle, we can usually touch the subclavian artery, and by moving the tumour from side to side, as freely as the fascia will permit, we discover whether, in its motions, it drags the vessel along with it. If the pulsation remain unchangeably in the same spot, we may reasonably infer, that the morbid parts are free from adhesion to the great artery, and if the arm be not benumbed, there is reason to hope that the nerves are free from adhesion to the tumour.

It is only, however, in those cases where the tumour has not enlarged so far, as to be jammed in behind the clavicle, that any approximation can be made to the nature of its adhesion. Where the tumour has originally been formed by enlargement of a gland, seated just above the clavicle, it is not only physically impossible to discover its connexions, but without care, even its nature may be mistaken. A simple glandular swelling may, from its being affected by the pulsation of the artery, be conceived to arise from aneurism of that vessel. This I have actually known happen.

I remember the case of a middle-aged man, in whom a pretty large pulsating tumour appeared from behind the sternal extremity of the left clavicle. It was bigger than a hen's egg, pulsated very strongly, and produced an inequality in the pulse at the wrist, great difficulty in swallowing, and a slight dyspnœa. The surgeon had no doubt of its being an aneurism; and accordingly he explained to the man his danger, and the great risk he would run of the tumour bursting, if he fatigued himself, or lived freely. On the faith of this, he prevailed on the patient to keep quietly in the house, and persuaded him to take great care of himself, and regularly once a-day, during some months, he visited him. During which time, the tumour did not enlarge, neither did the

pulsation become either more violent or more obscure.

This tedious restriction being not altogether to the patient's mind, and as he did not perceive that the danger was such as had been represented, he began to entertain an opinion of his own; he walked out, and ate and drank as plentifully as his means would permit, and found that the swelling, in place of enlarging, as had been predicted, really became smaller, the pulsation decreased in strength, and in the end, to the astonishment of all who saw him, both the tumour and beating disappeared. The history and issue of this case, proves that it was not aneurism. It was merely a glandular swelling, receiving an impulse from an artery beneath it, an occurrence by no means rare about the neck.

In extirpating tumours from this part of the neck, so soon as they are exposed the scalpel is to be laid aside. Then the morbid parts are to be cautiously detached by the fingers, tearing them from the tracheal toward the acromial side, by which the course of the vessels and nerves are followed. After the tumour has been in this way removed, it is to be carefully washed and examined lest any of the morbid substance has been torn, and left behind. Even when we are satisfied that the tumour has been removed entire, the finger is to be run over the wound, to ascertain that no enlarged gland, or indurated

cellular membrane be left. But here it is proper to remark, that the ruptured arteries, which are felt like small hard points projecting from the wound, are not to be confounded with specks of diseased matter.

By enlargement of the little glands exterior to the fascia, over this angular space, or over the sterno-mastoid muscle, tumours are frequently formed. Such swellings, even when large, may be very easily extirpated. I remember, however, a curious and fatal affection of one of these glands, which occurred to my brother several years ago. The patient was a strong and athletic man, who, about six years previous to his application at the Royal Infirmary, had received a smart blow on the neck, from the keel of a boat. This injury was soon followed by the formation of a firm, tense tumour, on the place which had been hurt. The swelling increased very slowly during the five years immediately succeeding its commencement, but during the sixth, it received a very rapid addition to its bulk. At this time it measured nearly six inches in diameter, seemed to be confined by a firm and dense covering, and the morbid parts had an obscure fluctuation. From first to last the tumour had been productive of very little pain.

Judging from the apparent fluctuation, that the tumour was incysted, it was resolved, at a consultation, to puncture the swelling, draw off its

contents, and then pass a seton through it. By plunging a lancet into it, only a very small quantity of blood, partly coagulated and partly fluid, was discharged,—a quantity so trifling, that after its evacuation the size of the tumour was not perceptibly reduced. A seton was passed through the swelling. At this time the man was in perfect health.

About ten hours after the operation, the patient was seized with extremely violent rigors, followed by heat, thirst, pain in the back, excessive pain in the tumour, and oppressive sickness.

An emetic was prescribed, but instead of producing vomiting, it operated as a cathartic. To remove the irritation, the seton was withdrawn. The pain in the tumour, however, and the general uneasiness continued to increase, and thirty hours after making the puncture, air began to issue from the tract of the seton; and afterwards the cellular membrane of the neck, and of the other parts of the body in succession, became distended with a gaseous fluid. In the course of a few hours after the commencement of the general emphysema, the man died.

Twelve hours after death, when the body was free from putrefaction, it was inspected. The emphysema was neither increased nor diminished since death, and some idea may be formed of its extent, when the scrotum was distended to the

size of the head of an adult. Even the cavities of the heart and the canals of the blood-vessels contained a considerable quantity of air. We could discover no direct communication between the tumour and the trachea or lungs, although such was carefully sought for.

This is not an unique case. Dr. Baillie gives the history of one which occurred in a female,* and another is to be found detailed by Dr. Huxam, in the London Medical Observations and Inquiries.† Emphysema was also witnessed by Wilmer, occurring during tedious labour.‡ In all of these cases it would appear that the emphysema had been dependent on rupture of some of the bronchial cells. Portal in his "Cours d'Anatomie Medicale,"‖ and in his work on Phthisis Pulmonalis,§ has shown that a connexion does subsist between the cellular texture of the lungs, and that of the rest of the body. He has proved this by wounding the lungs and blowing air into their substance, for in this way he filled the cellular membrane of the neck and arms. Portal does not, however, apply this fact to the explanation of emphysema not dependent on external violence.

* Transactions of the Medical Society of London, vol. i.

† Huxham's Letter to Mr. Leake, London Med. Obs. and Inquiries, vol. iii.

‡ Wilmer's Observations in Surgery, p. 143.

‖ Cours d'Anatomie Medicale, vol. ii. p. 4.

§ Observations sur La Nature et Le Traitement de La Phthisie Pulmonaire.

In my brother's case of spontaneous emphysema, and in Dr. Huxham's, the air evidently spread from the neck to the other parts; and in a case lately attended by Mr. Russel and myself, where we had an opportunity of inspecting the body after death, we had a clear demonstration of the passage of the air from the lungs into the cellular membrane of the neck. In this child, during the struggles for breath, which preceded dissolution, some of the bronchial cells had given way. During the irregularities of breathing, air was forced from the chest into the cellular membrane, about the lower part of the neck, along which it diffused itself, producing a swelling which crackled when pressed on by the fingers.

The child died very soon after the neck began to fill with air; consequently, in this instance, emphysema was partial. Had the patient lived long enough, there can be no doubt that it would have become general.

When we opened the body within twenty-four hours after death, in cold winter weather, we perceived no sign of beginning putrefaction, but we found the cellular texture of the lungs distended with air, which had passed along into the mediastinum. It had separated the laminæ of this septum to a considerable distance from each other. Next, it had mounted between these folds, till at last it had escaped from the chest behind the sternum, and then passing through the small

apertures in the cervical fascia, it had diffused itself among the cellular substance of the neck.

This case is valuable, since it shows that by mere rupture of a few of the bronchial cells, occasioned by irregular action of the lungs, or by some other internal cause, spontaneous diffusion of the air may take place. It illustrates what happened in my brother's case, and it throws a new light on the cases on record, of spontaneous emphysema; it shows that they are dependent on the same cause which gives rise to emphysema, acknowledged to depend on injury of the lungs; only, in the one case, the rupture of the bronchial cells is produced by a less obvious cause than in the other.

The relations and connexions of the subclavian artery, both before and after it has passed from between the scaleni muscles, are so important, that I have added a sketch of these parts from a boy.

Plate 4th, fig. 2. When preparing this view, the subject was laid on its back, and the head was permitted to hang over the end of the table. In this way all the parts about the root of the neck were fairly exposed. A, is placed on the clavicle. B, marks the trachea. C, the gullet. D, the sca-

lenus anticus muscle. E, the arteria innominata. F, the left carotid artery. G, the left subclavian artery, after it has passed from between the scaleni muscles. H, the termination of the internal jugular vein. I, the left subclavian vein, which receives K, the termination of the thoracic duct. The duct itself is seen mounting from behind the jugular vein, interposed between it and L, the trunk of the lower thyroid artery. The phrenic nerve M, and the nervus vagus N, are also placed in such a relation to the subclavian artery, before it reaches the scaleni muscles, that they add to the perplexity of the dissection of that vessel. Indeed, whoever contemplates these parts, will at once perceive the difficulty of including the subclavian artery in a ligature, nearer to the chest than the scaleni muscles. It has, however, been attempted, but without success. "The name of the gentleman who operated will be deemed a sufficient sanction of the belief, that no practicable means of relief were omitted."*

"In a case of subclavian aneurism, which lately occurred in Guy's Hospital, Mr. Astley Cooper attempted to tie the subclavian artery above the clavicle. The aneurism was very large, and the clavicle was thrust upward by the tumour, so as to make it impossible to pass a ligature under the artery, without incurring the risk of including

*Annual Medical Review, vol. ii. p. 427.

some of the nerves of the axillary plexus. The attempt was therefore abandoned."*

Nearer to the shoulder than the scaleni muscles the subclavian artery is seen lying interposed between O, the subclavian plexus of nerves, and the subclavian vein. Here we see that the connexions of the vessel are not of such a nature as to render an attempt to pass a ligature round it improper. The situation of the artery is, nevertheless, such as will occasion considerable difficulty in the execution of this design, which has, however, happily been achieved in the living subject, by Mr. Ramsden, of St. Bartholomew's Hospital.

Mr. Ramsden has published the case, along with some other interesting surgical observations. As his statement is, on many accounts, valuable, I here take the liberty of transcribing the case, together with the history of the operation, in the performance of which, Mr. Ramsden experienced considerable difficulty from the want of a proper needle to convey a ligature round the artery. Those who wish to make themselves acquainted with the various instruments contrived to assist in this part of the operation, may consult Bichat's edition of Desault's Works, vol. 2d, page 560, and Mr. Ramsden's Work, where several are delineated and described.

*London Medical Recorder, June, 1809.

"*Case of Axillary Aneurism, in which the Subclavian artery was tied.*

"This case did not prove ultimately successful; yet as all the more immediate objects of the operation were most satisfactorily attained, I have thought it right to submit the following detail to the perusal of the profession, under a presumption that it contains several practical facts of considerable importance, not only with reference to this particular operation, but also to our future conduct, in all cases of aneurism.

"John Townly, a tailor, aged thirty-two years, addicted to excessive intoxication, of an unhealthy and peculiarly anxious countenance, was admitted into St. Bartholomew's Hospital, on Tuesday the 2d of November, 1809, on account of an aneurism in the axilla of his right arm, which had been coming, he said, about four months. He could not trace its origin to any accident; at first, he supposed the swelling to be only a common bile, and therefore paid little attention to it, until the pulsation in the tumour, and a distressing tingling sensation in the ends of his fingers, deprived him of sleep, and rendered him incapable of working at his trade.

"When he was received into the hospital, the prominent part of the tumour in the axilla was of the size of the half of a large orange; there was also a very considerable enlargement and disten-

sion under the pectoral muscle and adjacent parts, which prevented the elbow from being brought by the distance of several inches, into contact with the side.

"The temperature of both arms was alike, and the pulse in the radial artery of each of them was correspondent. After the patient had been put to bed, some blood taken from the left arm, and his bowels emptied, his pulse, which on his admission, had been at 130, became less frequent; his countenance appeared more tranquil; and he experienced some remission of the distressing sensations in the affected arm; this relief was, however, of short duration; the weight and incumbrance of his arm soon became more and more oppressive, and in resistance to every medical assistance, his nights were again passed without sleep, and his countenance resumed the anxiety which had characterised it, when he first presented himself for advice.

"On the sixth day after his admission, his decline of health became so very evident, and the progressive elevation of the clavicle, from the increasing bulk of the tumour, was so decidedly creating additional difficulties to any future operation, that I considered it necessary to convene my colleagues, and avail myself of their opinions, as to the propriety of performing the operation; when it was agreed, in consultation, that as the tumour (although increasing) did not appear im-

mediately to endanger the life of the patient, from any probability of its bursting suddenly, it would be advisable yet to postpone the operation for the purpose of allowing the greatest possible time for the anastomosing vessels to become enlarged; and in the mean while, that the case should be most regularly watched.

"About this period of the case, the pulsation of the radial artery of the affected arm gradually became more obscure, and soon after either ceased entirely, or, what is more probable, was lost in the succeeding œdema of the fore arm and hand, both of which became loaded to a great extent. Notwithstanding the aneurismal tumour had continued to increase, and the patient's health had proportionally declined, yet no particular alteration was observed on the integuments, until I visited him in the evening of the twelfth day after his admission, when I found him complaining of more than usual weariness and weight in the affected limb, and painfully impatient, from the impossibility, as he described it, of finding a posture for his arm.

"On examining the tumour, a dark spot appeared on its centre, surrounded by inflammation, which threatened a more extensive destruction of the skin. Under these symptoms and appearances, no further postponement of the operation being admissible, I performed it next day in the following manner.

"*Of the Operation.*

"The patient being placed upon the operating table, with his head obliquely toward the light, and the affected arm supported by an assistant at an easy distance from the side, I made a transverse incision through the skin and platysma myoides, along and upon the upper edge of the clavicle, of about two inches and a half in length, beginning it nearest to the shoulder, and terminating its inner extremity at about half an inch within the outward edge of the sterno-cleido-mastoideus muscle. This incision divided a small superficial artery, which was directly secured. The skin above the clavicle being then pinched up between my own thumb and finger, and those of an assistant, I divided it from within outwards and upwards, in the line of the outer edge of the sterno-cleido-mastoideus muscle, to the extent of two inches.

"My object in pinching up the skin for the second incision, was to expose at once the superficial veins, and by dissecting them carefully from the cellular membrane, to place them out of my way without wounding them. This provision proved to be very useful, for it rendered the flow of blood, during the operation, very trifling, comparatively with what might otherwise have been expected; and therefore enabled me with the

greatest facility, to bring into view those parts which were to direct me to the artery.

"My assistant having now lowered the shoulder,* for the purpose of placing the first incision above the clavicle, (which I had designedly made along and upon that bone,) I continued the dissection with my scalpel, untill I had distinctly brought into sight the edge of the anterior scalenus muscle, immediately below the angle which it formed by the traversing belly of the omo-hyoideus and the edge of the sterno-cleido-mastoideus, and having placed my finger on the artery at the point where it presents itself between the scaleni, I found no difficulty in tracing it without touching any of the nerves to the lower edge of the upper rib, at which part I detached it with my finger nail, for the purpose of applying the ligature.

"Here, however, an embarrassment arose, which (although I was not unprepared for it) greatly exceeded my expectation. I had learned, from repeatedly performing this operation many years since, on the dead subject, that to pass the ligature under the subclavian artery with the needle commonly used in aneurisms, would be impracticable; I had therefore provided myself with instruments of various forms and curvatures,

*In my first incision I intentionally cut down along and upon the clavicle, as a security against wounding any superficial vessels; a very little lowering of the shoulder, therefore, placed the incision in the situation I wished to have it, for the purpose of proceeding with the operation.

to meet the difficulty, each of which most readily conveyed the ligature underneath the artery, but could serve me no farther; for being made of solid materials and fixed into handles, they would not allow of their points being brought up again at the very short curvature which the narrowness of the space between the clavicle and the rib afforded, and which, in this particular case, was rendered of unusual depth by the previous elevation of the shoulder by the tumour.

"After trying various means to overcome this difficulty, a probe of ductile metal was at length handed me, which I passed under the artery, and bringing up its point with a pair of small forceps, I succeeded in passing on the ligature, and then tied the subclavian artery at the part where I had previously detached it for that purpose. The drawing of the knot was unattended with pain, the wound was closed by the dry suture, and the patient was then returned to bed.

"*Appearances after Death.*

"On examination of the body after death, but few peculiarities presented themselves; some of them, however, appear to me to be well deserving our attention.

"The subclavian artery, excepting at the aneurismal aperture, was in a perfectly healthy state. The arteries branching off from it, on which the limb was to be dependent for its future support,

had not acquired any increase of capacity beyond that which is natural to them. The heart, and large vessels immediately in connexion with it, were perfectly sound, but on opening the vena cava superior, it was found to contain a large body of coagulable lymph, firmly adherent to its internal coat, and hanging pendulous into the auricle, where it applied itself like a valve, and totally obstructed the communication between the auricle and the ventricle.

"The aneurismal tumour contained about two pints of blood, the greater part of which was in so fluid a state, that it escaped through a small puncture which I made with my scalpel. The front of the tumour was covered with a strongly connected substance, bearing some resemblance to a sac, but its posterior, and other boundaries, were formed merely of those parts (unaltered from their healthy state) with which the effused blood had happened to come into contact.

"The subclavian artery, where the ligature was applied, was so very nearly separated, that it was only held together by a few shreds of dead matter. Each extremity of the almost divided artery, on being laid open, was found to be already completely consolidated and impervious, and no doubt could exist of its being at this period, fully competent to resist the impetus of the blood from the heart. I had also to remark, at these extremities, a small deposit of coagulable lymph, which

was closely connected with the internal coat of the vessel, and seemed to be placed there as an additional means of securing its obliteration."*

After the description of the surgical anatomy and relations of the subclavian artery and neighbouring parts, I am next led to attend to the situation of the deep-seated parts about the neck and face. In prosecuting this inquiry, the differences in the relation of these parts, as dependent on age, and change of position of the head, must be pointed out.

As the adult is to be considered the most perfect in formation, I shall first describe the parts as found at that period of life, and then notice the variations dependent on age and other circumstances.

In the living person, in whom no part about the throat is called into action, and in whom the base of the skull is placed parallel to the horizon,

* Since the publication of Mr. Ramsden's work, a considerable number of cases have been published, where the subclavian artery after passing the scaleni muscles has been tied. It must be confessed, that the majority of these have terminated unsuccessfully, yet as the disease, for the cure of which this operation is performed, is one of a nature which would speedily prove fatal were it not practised, no argument can be urged against its propriety from its frequent failure. A very interesting case where the operation was successfully performed by Dr. Post, the able professor of Anatomy in the University of New York, will be found in the ninth volume of the Medico Chirurgical Transactions, p. 185.—Ed.

the os hyoides can be felt through the integuments, situated about four finger-breadths behind the chin, and about a quarter of an inch lower in the throat than the margin of the jaw-bone. The upper prominent edge of the thyroid cartilage is traced, beginning about half an inch below the base of the hyoid bone, and is found, by following it with the finger, gradually sloping backward, and declining from the perpendicular as it descends. Between the os hyoides and thyroid cartilage, there is, on the fore part of the throat, a little hollow or vacuity, but laterally no deficiency can be perceived. Just below the thyroid cartilage, a similar but smaller hollow is felt. About three or four lines lower than the inferior edge of the thyroid cartilage, the cricoid cartilage is discovered, forming a prominent semicircle, resembling the body of the os hyoides. Next, by insinuating the finger and thumb between the margins of the sterno-mastoid muscles, we feel, just a little below the cricoid cartilage, a substance of a doughy consistence; but in the living subject, and in the healthy state of parts, its limits are by no means well defined. It is produced by, and marks the position of, the thyroid gland. Between the sterno-mastoid muscles, and below the thyroid gland, a hollow is felt, angular in its figure, containing the trachea: the point where we enter the windpipe, in performing the operation of tracheotomy.

All these parts can be easily distinguished on the living body, and consequently, the relation of the one to the other may be ascertained. In a full grown male, six finger-breadths will generally be found between the upper margin of the thyroid cartilage and the sternum. By dividing this into two equal portions, we define the superior border of the thyroid gland, and by allowing a single breadth of the finger for the average breadth of the gland itself, a space capable of admitting two fingers, is only left below the gland and above the sternum.

In performing operations on the throat, the head is seldom placed with the base of the skull parallel to the horizon, it is generally inclined at a considerable angle, which materially alters the position of the parts about the neck. When the occiput is fully turned back, the space between the chin and the chest is so greatly increased that twelve fingers can be placed between them. When the head is in this position, there is merely an oblique line running from the chin to the sternum, and presenting, in its course, small projections, formed by the prominent points of the cartilages of the larynx. When the base of the skull is placed parallel to the horizon, the thyroid cartilage lies somewhat more than three finger-breadths behind the chin; but when the occiput is turned back, if a thread be extended from the chin to the sternum, the thumb alone can be

introduced between it and the thyroid cartilage. When the head is in this position, rather more than four, but less than five fingers, can be placed between the chin and the upper margin of the thyroid cartilage. Somewhat more than three fingers can be laid between the top of the thyroid cartilage and the superior border of the thyroid gland,—then, after deducting a single breadth of the finger for the breadth of the gland, three finger-breadths remain between the lower edge of the gland and the highest point of the sternum. This statement, I have reason to believe, from repeated examinations made both on the living and dead body, forms a pretty near approximation to the truth. From this view of the subject it appears, that by bending back the head to its maximum, we increase, by one breadth of the finger, the space in which we perform the operation of tracheotomy.

By removing the integuments, external jugular veins, platysma myoides, and fascia, we expose the deep-seated parts. We bring first into view the sterno-mastoid muscle, which some way above the chest is crossed posteriorly by the omo-hyoideus. These muscles generally decussate each other nearly opposite to the upper margin of the cricoid cartilage, and about four finger-breadths above the clavicle. The latter is, however, a very uncertain rule, since the relative distance of the clavicle and jaw is liable to variation in dif-

ferent bodies. Yet, as the point of crossing of these muscles fixes a point in the position of the vessels of the neck, it is desirable that we be able to make a near approximation to the spot on the living subject. By laying a thread from the anterior part of the mastoid process to the centre of the upper bone of the sternum, and by extending another from the side of the body of the os hyoides to a little nearer the sternum than the central part of the clavicle, we describe pretty accurately the course of the muscles. The first thread defines the anterior margin of the sterno-mastoid, while the other follows the direction of the omo-hyoideus. Just beneath the point of intersection of these two lines, the common carotid is generally placed—I say, generally, for I would not wish to inculcate, that it is an invariable occurrence. It is, however, so frequent, that it is of consequence that the operator know how it is to be discovered. Above this spot the course of the artery may be discovered, by laying a thread from the point of decussation up to the jaw-bone. Lower in the neck we have no certain rule by which to discover the situation of the carotid.

The common carotid artery, from the root of the neck up to the spot where it bifurcates, is surrounded by large vessels and important nerves. The nerves are the ramus descendens noni, the nervus vagus, and the sympathetic. Along the

whole course of the common carotid we find the nervus vagus, and the large internal jugular vein inclosed in a cellular sheath, along with the carotid artery. The sympathetic nerve lies exterior to the sheath, between it and the longus colli muscle, to which it is joined by cellular membrane. That the sympathetic nerve is not inclosed in the vascular sheath may be demonstrated by a very simple experiment. Let the front of the sheath be exposed, then grasp it between the blades of a pair of dressing forceps, and pull it forward; now, by examination it will be found, that, along with the sheath, the carotid artery, the jugular vein, the descendens noni, and the nervus vagus, will be drawn away from the spine, while the sympathetic remains attached to the muscle behind.

The jugular vein lies on the acromial side of the carotid artery; the nervus vagus lies between the vein and the artery, and the artery itself is placed next to the trachea; the ramus descendens noni runs down on the fore part of the carotid, forming a beautiful series of fibrillæ over the omo-hyoideus, sterno-hyoideus, and sterno-thyroideus muscles,—a plexus inimitably delineated by Scarpa, in his splendid work on the nerves of the neck.

The ramus descendens noni, generally, just above the point of decussation of the sterno-mastoid and omo-hyoideus, receives additions,

sometimes from the second and third of the cervical nerves, but at other times only from the latter of these nerves. These twigs pass along between the common carotid artery and internal jugular vein. Where they join the descendens noni, a little swelling is generally formed, from which twigs are sent off in every direction to the neighbouring muscles. Sometimes this nerve is contained in the carotid sheath, but frequently it is placed exterior to it, in which case, the communicating twigs from the cervical nerves cross on the fore part of the internal jugular vein, not inclosed in the sheath.

In pointing out the depth of the artery, vein, and nerves, at different parts of the neck, it will be necessary to divide the latter into three suppositious regions; a lower, a middle, and an upper. The middle region will be defined by drawing a line from the root of the mastoid process to the junction of the horn with the body of the os hyoides, by running another from the anterior edge of the mastoid process to the centre of the upper bone of the sternum, and by extending a third from the side of the body of the hyoid bone, to near the centre of the clavicle. By these three lines a portion of the side of the neck, nearly of a triangular shape, is insulated.

Along the whole extent of this which forms the middle region of the neck, the carotid artery is accompanied by the nerves and jugular vein, as

already described, and in this situation, these parts are very superficial, they are merely covered by the integuments, the platysma-myoides, the fascia of the neck, and their own cellular sheath.

Here, then, is the proper spot, provided the place be in our choice, to lay bare the vessel to take it up. Lower in the neck it is deeper seated, and higher it is sunk behind the angle of the jaw. At the lower part of the neck, besides the integuments, the platysma myoides, the fascia, and the common sheath, the artery is covered by the sterno-mastoid, the sterno-thyroid, and the omo-hyoid muscles. Hence, it is really deeper in the lower region of the neck than in the middle, although Mr. John Bell asserts, that the carotid becomes deeper the further it retreats from the chest. Mr. Bell's description is only applicable to a front view of the neck, in which case, as the larynx projects, the artery seems to be thrown back; but let any one look at these parts in profile, and he will instantly be convinced that this is an exceedingly incorrect description. Although, however, the carotid lies deeper at the lower, than at the middle part of the neck, it is more readily, in attempts to commit suicide, reached at the former, than at the latter place, where, unless the knife be plunged into the side of the neck, the firm cartilages of the larynx guard the artery

from injury. Below the triangular space, the knife passes through the less solid substance.

In the lower region of the neck the carotid artery on the left side lies just on the outer edge of the œsophagus, which is seen in Plate 4th, fig. 2, projecting from beneath the trachea. It is covered by twigs of the recurrent nerve, and crossed by the lower thyroid artery, which traverses it in its course to the gland. Just at the commencement of the gullet, the left lobe of the thyroid gland is laid over its surface, and supported in contact with it by the ribbon-like sterno thyroid muscle. Beneath the muscle, between it and the œsophagus, a cluster of small conglobate glands are situated.

These glands sometimes enlarge, producing, from the bracing of the muscle, very serious difficulty in swallowing. When they enlarge, the tumour formed is deep-seated, and in two cases which I have seen, the swellings seemed, from the condition of the muscles covering them, to be more diffused than they really were. Such tumours frequently suppurate, forming a deep-seated abscess, in which fluctuation can hardly be perceived, and which generally bursts into some part deeper seated than the fascia. The matter is by no means unfrequently poured into the gullet or trachea, or even into the jugular vein, as we learn from a case related in one of the periodical publications. In a case where the abscess had burst

into the trachea, the patient could inflate the sac, he was teased with cough, expectorated purulent cough, and died hectic. From the risk of the abscess bursting into one or other of the parts mentioned, it is at all times adviseable to promote resolution; but where this cannot be accomplished when an abscess forms, it is to be kept in remembrance, that if the surgeon delay till fluctuation become distinct, he may have waited too long. So soon, therefore, as there is just reason to believe that pus is formed, it must be discharged by an opening cautiously made into the sac; I say cautiously, as I have seen the ramus thyroideus of the lower thyroid artery projected before an abscess in that part of the neck.

Where the tumour is of a specific nature, early extirpation will be the only hope of saving the patient. Indeed, it is only in the first stage of such a tumour, that an operation would be adviseable. Where the tumour is already large, it will have come in contact with the thyroid gland, with the common sheath of the vessels and nerves, will be closely connected with the recurrent nerve, the ramus thyroideus of the inferior thyroid artery, and the gullet. Although any of these connexions, considered individually, would not be deemed sufficient to prohibit the extirpation of the morbid parts, yet, when they are viewed collectively, few will hesitate as to the propriety of declining an operation.

The pharynx does not terminate in the œsophagus till it has passed the lower border of the cricoid cartilage, nor does it even there suddenly contract. For some way above, it had been gradually tapering, so that at last the transition from the expanded pharynx into the narrow gullet is far from being abrupt. Yet the change is so great, that a substance which has passed the tapering part of the pharnyx will be detained in the upper part of the œsophagus. This will require to be fixed on the memory; as it explains the reason why a solid morsel of food, or other bulky substance, is detained just below the termination of the larynx. If it pass the beginning of the œsophagus, it may, uniformly, where the gullet is not strictured nearer the stomach, be pushed into that viscus by the probang. But if it stick just at the top of the œsophagus, it is there too low to be laid hold of by the finger, and even curved forceps can hardly be so applied as to extract the foreign body, neither will the probang enable us to force it into the stomach; or granting that it would, we may have reasons for not wishing to place it there.

Where, therefore, an extraneous substance has become firmly impacted in the top of the gullet, and where it is so placed that it prevents the descent of food into the stomach, or, by its pressure on the trachea, obstructs breathing, there ought to be no hesitation in performing the operation of

œsophagotomy;—an operation which a careful review of the anatomy of the neck, and a due regard to the circumstances under which it is had recourse to, will induce one to believe, has been generally much over-rated in its danger. The surgeon is not from this to suppose that it is the simplest operation in surgery; yet I would as unwillingly have him imagine that it is one of the most difficult in its execution. Let him attentively examine the relation of the parts around the gullet, and let him take into consideration the condition in which the œsophagus itself is placed, and he will be convinced that œsophagotomy may, with perfect safety, be performed. The gullet, where projected from behind the trachea, is covered by the twigs of the recurrent nerve, and traversed by the thyroid branch of the lower thyroid artery, which are really the principal parts to be avoided in performing this operation. I have no fear that injury of these would influence the ultimate success of the operation; but as no good can possibly be derived from their division, and as such may be productive of harm, the surgeon can have no excuse for not avoiding them. The pulsation of the artery will lead to a knowledge of its situation, and the nerve may be detected by sponging away the blood. But one who digs behind the sternal muscles with the scalpel, can scarcely avoid cutting these parts; nay one who does not recollect that where œsophago-

tomy is really required, the gullet is, at the part where it ought to be entered, distended, and consequently brought into close contact with, and firmly pressed against these muscles, will be very liable at the time he penetrates the muscles, to injure the parts behind. In executing this part of the operation, the greatest caution is required, and the subsequent exposure of the gullet, ought to be entirely done with the finger, nor ought the scalpel to be again taken up, nor any attempt made to open the œsophagus, till the position of both the recurrent nerve, and the thyroid branch of the lower thyroid artery has been ascertained, and the lateral lobe of the thyroid gland be turned aside. This will be indispensably necessary, as that portion of the gland rests on the very commencement of the gullet. I consider as puerile, the opinion that the carotid is in danger; he must be wanton, indeed, in the use of his knife, who hurts this vessel. It is evident, that this dread does not arise from the actual examination of a body, in which a foreign substance is impacted in the gullet. In such, the carotid, it will be observed, is fairly pushed to a side by the swelling; it is quite out of the reach of injury, unless an attempt be made to cut into the œsophagus, very low indeed in the neck. Just above the chest, the gullet is rather overlapped by the common carotid; here, therefore, there may be some danger of wounding that ves-

sel, but this is a part where no one in his senses would ever propose to open the œsophagus. That must be done higher in the neck, at a point where the carotid is perfectly safe.

Much of the reasoning in regard to this operation, has been drawn from the contemplation of the relations of the œsophagus to the neighbouring parts in a state of health. It has seldom been taken into account, that the distension of the gullet renders the operation safer. The foreign substance is, in fact, as much a guide in entering the gullet, as the staff is in performing the operation of lithotomy. Were the œsophagus empty and contracted, then, no doubt, the dissection required to reach it would be deeper; but still, there is nothing which ought to render it hazardous to accomplish, and nothing which would deter one who knew the parts as he ought to do, from undertaking its performance. That it may be safely accomplished, does not rest on such speculative evidence. It has on different occasions been executed on the living subject, and has succeeded. Let not, therefore, its expediency be questioned, nor its safety doubted. I wish to impress the student with the belief, that œsophagotomy is an operation neither dangerous, nor very difficult in its performance; but I would, at the same time assure him, that the ease and safety with which it may be executed, will be entirely regulated by his own knowledge of the locality of the parts he has to cut.

The surgeon must not only keep in remembrance the usual relation of parts about the neck, but he must also be aware, that there are varieties in the distribution of the arteries, by which branches are brought within reach of the knife, which naturally ought not to be there. I have never read of any instance of this kind, but have once seen an anomalous vessel placed, so that it was in danger of being hurt. The case to which I allude, is at present before me. The subject is aged between ten and twelve years. In it an artery, rather larger than a crow quill, rising from the very root of the arteria innominata, mounting up along the trachea, between it and the sternal muscles, a little below the thyroid gland, it suddenly turns aside, places itself over the œsophagus, and creeps up along it, so as at last to touch the lower margin of the left lateral lobe of the thyroid gland. It is demonstrable, that had œsophagotomy been required on this person, this artery would probably have been injured. But although it would have poured out a considerable quantity of blood, still the ligature could easily have been applied, and it ought to have been applied before the gullet itself was opened.

For a description of the manner in which the operation is to be performed, and for a detail of the after-treatment; and also an account of the way in which extraneous bodies, not of such a nature as to require œsophagotomy, are to be

removed, I refer to the different works on Surgery.

In the middle region of the neck, there are lodged, besides the ramus descendens noni, the nervus vagus, the sympathetic nerve, and the jugular vein, some other parts which will require to be enumerated. Nearly opposite to the division of the common carotid artery, the superior cervical ganglion of the sympathetic nerve, sends off a slender branch, which descends along the tracheal margin of the great artery, and receiving numerous twigs from all the nerves in the vicinity, it becomes at length of considerable size*. At the root of the neck, it is especially interwoven with the twigs of the recurrent nerve, and then by attaching itself to the aorta, it is conducted to the heart. Anatomists have chosen to name it the nervus superficialis cordis, and I would add, that it is a nerve, which, on account of the valuable function of the organ on which it is distributed, ought, in every operation, to be avoided. There are no experiments indeed to prove the effect which would result from injury of this nerve, but analogical experience would lead us to suppose, that it would be highly injurious, if not absolutely fatal.

The upper laryngeal nerve emerges from behind the internal carotid, a few lines above the

* The nervus superficialis cordis occasionally takes its origin from the lower cervical ganglion.—Ed.

upper border of the thyroid cartilage, and directly slips in behind the hyo-thyroideus muscle, along with the superior laryngeal artery. A twig from the eighth pair, about the size of the fourth pair, accompanies the ramus thyroideus of the superior thyroid artery.

Along the whole of the middle region of the neck, the common carotid artery is accompanied by the glandulæ concatenatæ. Some of this chain lie anterior to the vessel, while others are interposed between it and the spine. When one of these glands enlarges, the tumour, from its connexion with the large artery, has some of the characters of aneurism, and is often mistaken for that disease. I have now had occasion to see several such cases. I may mention the outlines of one. The patient, a female, advanced to middle age, had, for several months, complained of a slight degree of pain and fulness on the left side of the thyroid cartilage. These she had neglected, till, at last, a perceptible swelling was formed on the side of the neck. When I saw her, the tumour was about the size of a large walnut, and it seemed to have a strong pulsation. That it was alternately raised and depressed by the action of the carotid, was most evident, and that it was an aneurism of that vessel, several who saw it, and who satisfied themselves with a superficial examination, firmly believed. Indeed, as it seemed to pulsate, few,

unless warned of the ambiguous nature of tumours here, would have doubted that it had originated from a disease of the artery. It was only by a careful examination, that its apparent, could be distinguished from real, pulsation. One who grasped the part between the fingers, was readily convinced that although the swelling was elevated and depressed, the rising and falling did not depend on any variation in the magnitude of the swelling itself. It was satisfactorily perceived to depend on the action communicated from the carotid to the tumour. By lateral pressure, the size of the tumour could not be reduced, but by pulling it forward, removing the swelling from the sphere of action of the large artery, all trace of pulsation was destroyed. This was decisive of its real nature, and in this way, a glandular tumour, which apparently pulsates, can always be readily distinguished from aneurism. In the latter case, the swelling continues to beat, it becomes alternately tense and puffed up, and smaller and more flaccid. Whereas the diameter of a glandular tumour never varies, it is solid in its consistence, and is uniformly incompressible.

I have no doubt that some of the reputed cases of aneurism, in which spontaneous recovery took place, had been merely glandular tumours, placed over the course of a large artery, and receiving an impulse from the vessel

beneath. It occurs to me, that this was the real nature of the tumours described by Dr. Heberden, which arose in the neck without any obvious cause, which continued for a length of time stationary, seeming to pulsate, and which slowly disappeared without either suppurating or bursting. Indeed, in every case of glandular tumour, placed over the course of a large artery, the swelling seems to have a stronger pulsation than the artery itself, provided it be not buried beneath thick and strong muscles. In the groin, the ham, and the middle region of the neck, the apparent pulsation of such tumours is frequently most furious. Where, however, the swelling forms above the line of the digastric muscle, or beneath the point of decussation of the sterno-mastoid muscle by the omo-hyoideus, then, as the glands and vessel are deep-seated, the pulsation is more obscure. Even tumours, formed in the middle region of the neck, lose their apparent pulsation, when they have acquired a large size. Their pressure impedes the action of the artery, and they become too bulky to be affected by the systole or diastole of the vessel. The only circumstances under which a large tumour can retain its seeming pulsation, is the artery being projected on the front of the swelling. But here there can be no difficulty in distinguishing the disease from aneurism. The defined course of the pulsation, its

being only felt along a particular part of the swelling, and the unchangeable nature of the tumour, lead to an acquaintance with the disease. The symptoms are, indeed, such as would only lead the most ignorant to a supposition of aneurism.

From the locality of tumours produced by enlargement of the glandulæ concatenatæ, respiration and deglutition are soon affected; and it will generally be found, that by the pressure of the swelling on the nervus vagus, and the sympathetic nerve, the functions of the chylopoietic viscera are impaired. From these considerations, the most vigorous measures must be pursued for their removal, and these means must be varied according to the nature of the tumour, and the object we have in view. Where we are foiled in our attempts to get rid of them without operation, they must be extirpated; but it is to be remembered, that this can only be safely accomplished in the early stage of the complaint.

If the tumour has been permitted to become large, it will be found firmly fixed to the muscles, nerves, and vessels in the vicinity; its adhesions are then such, that no prudent operator would attempt excision. The first point to be ascertained, is, whether the tumour be free from adhesion to the artery. In emaciated subjects, this it very easily done. The tumour is to be grasped between the fingers of the right hand, while a finger of the left is to be placed over the artery, just

below the swelling; then by moving the tumour from side to side, and pulling it outward, its relation to the vessel will be ascertained. If the artery roll along with the morbid parts, an operation is out of the question;* but when it remains stationary, if other circumstances be favourable, the tumour may be taken away. Where the gland has originally been placed behind the carotid, it will often be found that the tumour has risen up on each side of the artery, so as to bury it, the jugular vein, the nervus vagus, and the ramus descendens noni, in the very centre of the morbid parts. This I have myself observed, while dissecting such a tumour, and if I have not been misinformed, one surgeon, from neglecting to ascertain the connexion of the swelling, met with a similar occurrence, while performing the operation on the living subject.

Let, therefore, no one resolve on the removal of any tumour from beneath the fascia, at the side of the neck, till he has previously fully ascertained all its connexions. If these be found such as to warrant the performance of an operation, let not procrastination destroy the hope of the patient.

* Mr. Burns' observations as to the impropriety of attempting the removal of a tumour, when we have ascertained that it is connected with the carotid artery, go a great deal too far. The connexion of the artery with the tumour, or even the vessel being surrounded by its substance, should not offer to the dextrous surgeon, an insurmountable objection against an operation for its extirpation, when he is satisfied that this is required for the safety of the patient.—Ed.

Proceed without delay to its extirpation, place the patient in a proper position, make then an incision through the integuments, the platysma myoides, and the fascia, down to the tumour, which next expose, by dissecting back the parts which cover it. Now, lay aside the knife, act with boldness and decision, grasp the tumour firmly with the fingers and thumb of the right hand, ascertain that the hold is secure, and instantly and steadily wrench it from its attachments behind. This, if executed with proper rapidity, is not more painful than the more tedious removal with the scalpal would have been, is seldom followed by bleeding, and is infinitely less dangerous; indeed, so fully convinced are the best and most expert surgeons of the truth of this, that few of them now, in extirpating tumours from the neck or axilla, employ the knife, after the external incision has been made.

In the middle region of the neck a small gland is found, seldom larger in its healthy state than a millet seed, but which will require to have its connexions pointed out. This gland is placed between the os hyoides and thyroid cartilage, lying beneath the hyo-thyroideus muscle, imbedded in much fat, and merely separated from the epiglottis and bag of the pharynx by the thin membrane which is stretched from the hyoid bone to the thyroid cartilage. When this gland enlarges, as it is firmly braced down by the hyo-

thyroideus muscle, by the cervical fascia, and by the platysma myoides, its effects on the function of deglutition and respiration are most dreadful. A few months ago, I dissected a body, in which this gland was affected with fungus hæmatodes, but as the tumour was small, and the disease in the incipient stage, the discovery of the morbid parts was accidental. Some years ago, I saw a similar affection of this gland in a female, the particulars of whose case I select from my brother's notes, taken during the progress of the disease.

The patient, who was of an emaciated look, and sallow complexion, began, about eleven months ago, to complain of uneasiness in swallowing, and slight pain on pressing the throat; but till within the last six months she neither perceived any fulness nor swelling about the neck.

Now, on examination, there is a firm elastic tumour, about the size of a large walnut, and rather flat, perceived on the left side of the thyroid cartilage. It adheres firmly to it, and covers nearly three-fourths of its lateral flap, and it occupies all the space between the hyoid bone and the thyroid cartilage; so that by thrusting the finger deep behind the mouth, the tumour is felt projecting into the pharynx, placed a little below the angle of the jaw, and lying close on

the arytœnoid cartilage and root of the epiglottis.

On pressing the tumour, it obstructs respiration, and at all times it produces a hoarse, whizzing noise; yet from the greater pliancy of the pharynx, it particularly affects deglutition, rendering this uniformly difficult and painful. From its effects on the velum when she attempts to swallow fluids, part of them pass back into the nose, and sometimes even escape by the nostril. The swelling, which of late has been increasing in size, is attended with reiterated paroxysms of lancinating pain, so severe, that her rest is broken, and the body drenched in perspiration.

As the disease advanced, the tumour hardly became larger externally, but it continued to encroach more and more on the pharynx, and finally destroyed the patient, by its effects on breathing and swallowing.

On dissection, which was performed in the presence of Dr. Cleghorn, the morbid parts, which were of a soft medullary structure, a greyish colour, and enclosed in a membranous capsule, presented the appearance of two tumours: one situated in the original position of the gland; the other, and larger, lying more in the place of the pharynx. It, indeed, protruded inward, the thin membrane stretched from the os-hyoides to the thyroid cartilage, so as to fill nearly the whole bag of the pharynx. It covered the left

wing of the thyroid cartilage, and by its pressure on the epiglottis and arytœnoid cartilage, nearly obliterated the rima glottidis.

As description cannot convey any defined idea of the connexions of the morbid parts, I add the following sketches, which were taken from the recent parts, and which show accurately, the relations of the tumour to the parts in the vicinity.

DESCRIPTION OF PLATE V.

FIGURE FIRST.

A, the external division of the tumour, which has been brought into view by removing the integuments, the fascia, and the platysma myoides.—B, the horn of the os-hyoides.—E, the hyo-thyroideus muscle.—F, the sterno-thyroideus.—G, the omo-hyoideus.—H, the common carotid artery.—I, the ramus thyroideus of the upper thyroid artery, which in this subject, arises an independent vessel from the common carotid. It is very small, and in its course to the thyroid gland, it traverses the lower edge of the tumour.—K, the external carotid artery.—L, the ramus laryngeus superior, which arises from the external carotid, and is seen plunging into the sulcus, which divides the tumour into two portions.—It is large, and it is also worthy of being remarked, that it is the only vessel connected with the tumour. The nerve which accompanied it, has been removed, but it was in every respect healthy.—M, the lingual, and N, the labial artery, both of which run above the horn of the hyoid bone, and consequently are removed from the morbid parts.

The veins corresponding to the arteries were varicose, but the conglobate glands were unaffected.

DESCRIPTION OF FIGURE SECOND.

To obtain this view, the sides and back part of the pharynx have been removed. A, that large portion of the tumour which occupied the bag of the pharynx, now fully exposed, by dissecting away the thin membrane which was stretched from the hyoid bone, to the thyroid cartilage, and which is seen flattened on its posterior surface, by resting on the spine, between which, and the tumour, there was merely the back part of the pharynx interposed.—B, the root of the tongue.—C, the epiglottis distorted by the pressure of the tumour.—D, the glottis exposed, by pushing the tumour aside by a slip of whalebone.—E, the right wing of the thyroid cartilage showing the small space between the tumour and it, even when the former has been displaced by the whalebone. The relation of the morbid parts to the glottis and to the pharynx, will at once explain the induction of the dyspnœa and dysphagia, and will show that little of the food could be transmitted into F, the gullet, into which a piece of wood has been introduced. As the other parts can be readily traced from their relation to those lettered, it will be unnecessary to specify them.

The history and dissection of this case I have fully detailed, as it will, along with many others, establish the position, that tumours in the neck, if they are to be removed, ought to be early extirpated, as they otherwise plunge deep, and form connexions from which they cannot be detached

When we consider the absolute necessity there is for removing the whole diseased parts, it becomes evident, that unless the operation be performed early, it ought to be prohibited. When the tumour penetrates deep and internally, it cannot be completely taken away; its adhesions to the vessels and nerves forbid this; and to cut into it, and at the same time not to clear it fairly away, is to irritate and extend what is left behind.

That the life of this woman might have been saved in the early stage of the disease, few will doubt. The tumour was then small, its adhesions were limited, and to parts of no primary importance. There was nothing therefore to have prevented its removal. To reach the tumour, the integuments, platysma myoides and fascia, would alone have required to have been divided, and in tearing it out, the upper laryngeal artery and nerve, would have been the only parts which to a certainty, would have been injured. Perhaps it might have been found, that from the firm fixture of the morbid parts to the membrane extended from the os-hyoides, to the thyroid cartilage, there might have been a necessity for cutting it out along with the tumour. But even granting that an opening had been made into the fauces, still that would have been a matter of little consequence, and should have been no objection to the operation. Under much worse circumstances,

Desault has shown that the patient may be nourished through a flexible tube, passed along the nostril into the œsophagus, until the wound has closed.

These points were reflected on; the propriety of submitting to the extirpation of the tumour, was explained to the patient, who, satisfied of the expediency of the operation, readily gave her consent to its performance. In the mean time, she consulted a surgeon in whom she had much confidence, and he, without inquiring further into the merits of the case, than merely to ascertain that the tumour was placed in the neck, informed her that she ought on no account to allow its extirpation, that the danger of wounding the large vessels and nerves, was incalculable, and besides, that there was a hope that the swelling might be discussed. She delayed from day to day, and from week to week, wasting time in the trial of leeches, and blisters, and frictions over the tumour; she waited in the vain expectation that these means would lessen the swelling, till at length she became convinced, that her safety had been sacrificed by one who knew little of the resources of surgery, and who dreaded the operation, merely because he was ignorant of the relations of the vessels and nerves. Timidity or rashness must be the attendant of ignorance, either of which, in our profession, is highly culpable.

It was most distressing to witness the struggles for breath, and the cravings for food, in the decline of this woman's life; yet the period had passed, when it was advisable that any attempt should be made to remove the tumour. The features were haggard, the countenance was expressive of keen anxiety, the languid eye rolled without ceasing, from object to object, and at each gasp the muscles about the neck started from their place, so that they might have been demonstrated by the prominence of their lines. She was now eager to submit to any operation, but prudence compelled us reluctantly to confess, that palliation was all that surgery could now accomplish; we were under the mortifying necessity of declining the very measure we had recommended a few months before. Let this, therefore, be a warning to all; let them learn from this case, never to give an opinion on any surgical question which concerns the life of a patient, till, by previous study, they have made themselves acquainted with the structure of the parts. Let them view these in their healthy relations, and trace the changes produced by the disease, and then they may reasonably hope to give a judicious opinion.

In the middle region of the neck, and consequently at a part where the common carotid artery is merely covered by the skin, platysma myoides and fascia, it divides into two vessels, one

large, the other smaller; one distributed to the parts within the skull, the other ramified on the parts exterior to it; one named thence the external, the other called the internal carotid artery.

In regard to the spot where the common carotid artery divides into the external and internal vessels, there is no certainty. It varies in different subjects. Mr. Bell says, "when the common carotid artery has risen to the angle of the jaw, it divides into two great arteries;" and again, "instead of branching at the larynx, it does not do so until it arrives at the corner of the jaw; there, as I have observed, it can, as in an axilla, lie deep and safe."* Even in the adult, however, so high a division is a rare occurrence, and in the child it never happens. Generally, in both the young and old subject, the bifurcation of the common carotid artery is placed opposite to the upper margin of the thyroid cartilage. But in fact, the place of division of the common carotid artery, is liable to great variety, both in point of situation and appearance. Sometimes it bifurcates low in the neck, at other times it does not divide at all, but merely sends off branches on every side; and in not a few instances, a series of large branches are found, in place of an external carotid. In one of our subjects, the common carotid separated into its two trunks low in the neck. The division took

* Bell's Anatomy, vol. 2.

place opposite to the upper edge of the sixth cervical vertebra, and about three inches below the angle of the jaw. The two vessels mounted along the side of the larynx parallel to each other, and enveloped in the same sheath with the internal jugular vein and nervus vagus.

In a preparation of the vessels of the head and neck which is in my possession, the external carotid is a short thick stump, resembling the axis arteriæ cœliacæ, and like it, from the top of this, the large branches take their origin. This mode of arrangement constitutes a very beautiful variety in the appearance of the vessels. As the parts on which they are to be distributed, lie above, and on every side, the branches in their course to these, form a very fine vascular fan.

In another preparation which was also in my possession, the common carotid, instead of dividing in the neck, sends off lateral branches, till it reaches considerably beyond the angle of the jaw. Opposite to the root of the styloid process, it divided into two branches, one formed the internal carotid, the other was the conjoined trunk of the temporal and internal maxillary arteries.

In operating about the neck, it is necessary to be aware of these varieties in the course and arrangement of its vessels, otherwise, an operator may feel himself considerably puzzled. Nor is it sufficient that he remembers the anomalies of these vessels, he must also make himself acquainted with

the general situation of the external and internal carotid arteries. He must be aware that the external carotid lies nearer the surface, and closer to the pharynx, than the internal; consequently, that the former is considerably removed from the nerves and large vein. It is, therefore, much easier to pass a ligature round the external carotid artery, than round either the internal or the common carotid. Both of the latter are in absolute contact with the large nerves, and internal jugular vein.

The necessity of cutting down, by a deliberate dissection on the carotid artery, and passing a ligature round it, is now no longer a matter of speculation. The surgeon no longer hesitates to perform this operation, because he is well aware that the danger, although great, is not sufficient to deter him. But the operation is truly a bold one. The artery is of large size, is entangled among important nerves, and is attached by cellular membrane to the great vein which returns the blood from the brain; without, therefore, great care and delicacy in dissection, it can hardly be taken up without injuring either the vein or nerves. These occasion embarrassments while dissecting down to the artery, which are felt by even the most expert surgeon, and most accurate anatomist; but how much these must be increased when all the parts are covered with blood, and the patient struggling from pain, can only be appreciated by

those who have been in the habit of seeing operations performed.

As we are interested not only in the consideration of the local anatomy of the neck, and in deducing from our acquaintance with the structure, the proper mode of operating; but are also concerned in obtaining just and comprehensive views of the general principles which ought to direct our practice, it cannot be supposed foreign to the object of this book, to investigate the general causes which have a tendency to occasion failure of the operation for the cure of aneurism. These general causes must be thoroughly known in order to be avoided. The discussion of these points will lead to the illustration of those circumstances which influence the success of the operation for carotid aneurism.

Compression is the principle and foundation of every plan which has been adopted for the cure of aneurism. The only difference consists in the mode of applying the pressure. General compression was the first plan employed, but its defects were discovered, and another mode introduced. The artery was exposed by incision, and the pressure applied directly to the vessel itself. Each of these plans has had its advocates and opponents; and each, it must be confessed, has succeeded in accomplishing a cure. Now, that our knowledge of the animal economy is more extend-

ed and correct, we can better appreciate the relative merit of these modes, which, as practised by our ancestors, were extremely defective. In their hands they were employed on empirical principles. At first sight, it is apparent, that the same plan of treatment could not reasonably be expected to answer in every case; nevertheless, however varied the nature of the tumour, still the plan pursued by our forefathers was identically the same. No matter whether the tumour was large, tense, painful and discoloured on the surface, or small and hard, and beating furiously; the bandage and compression were employed, and rules were prescribed for the prevention of gangrene.

I cannot, however, discover much use in tracing, with antiquarian minuteness, the practices of past ages, which are long since forgotten, or if still remembered, remembered only as a foil to our modern improvements. No doubt, it is highly advantageous to the younger part of the profession, that the progress of improvement should be pointed out, and the more especially where such improvement has been owing to advancement in anatomical and physiological knowledge. In this point of view, a historical account of the operations of surgery is highly valuable, for it impresses on the mind an important fact, and shows that the practice of our art is not to be fixed on firm and immutable princi-

ples, unless these be deduced from a comprehensive acquaintance with the structure and functions of the living system. If this primary object be kept in recollection; and if, in proceeding, it be fairly stated why the different modes were introduced, no one can possibly object to a review of the practices of antiquity. But what, I would inquire, is to be gained by the usual histories of surgery, which are seldom more than mere notifications;—that Celsus did one thing; Galen another; and Etius a third. In aneurism the truth of this has been most amply proved. It may be asked, was there from remote antiquity down to Hunter, a single addition made to our practical knowledge on the subject of aneurism? Was this dependent on want of anatomical information? Without doubt this was partly the cause; but I think it chiefly arose from indolence and want of inclination to collect, arrange, and deduce the proper practical conclusions, from the data in their possession. Was it not known, previous to the time of Hunter, that the vessel in the immediate vicinity of an aneurism was generally diseased? And was it not also fully proved that after the wound of a healthy artery, the vessel, if included in a ligature, became obliterated? It did not, one would imagine, require the genius of a Hunter to draw the proper inference from these facts; yet it was left for him to do so. He improved the operation, he laid the foundation of

our practice; but to Drs. Thomson, Jones, and Scarpa, we are deeply indebted for our present success.

In tracing the history of this operation, I shall, in the first place, notice the mode of cure by general compression of the member, pointing out the advantages and defects of this plan; next, the cure by ligature of the vessel, which is alone to be employed in carotid aneurism, shall be attended to; the causes will be shown why this plan, at its introduction, seldom succeeded; and the progressive improvement in the mode of using the ligature, which has arisen from our extended knowledge of the structure and relation of the coats of the arteries, shall be explained.

Previous to the introduction into use of the ligature, general compression was, along with trivial external applications to the tumour, entirely trusted to. Nor are the cases wanting, in which the compression was successfully employed. At the present day, some recommend its indiscriminate use in every instance, while others are equally decided that it should be employed in no case. Those who adopt the practice, or who reject its employment, ought to be acquainted with the principles on which they proceed; but few who are thus decided act on any principle except that of imitation. Experience proves that there are cases in which general compression may be most beneficially used; but it, at the

same time, informs us, that there are others in which it would be most injurious. What then are the cases in which general compression is advisable, and what the reverse? One who is acquainted with the mode by which a spontaneous cure is effected, will be at no loss to answer this question. He will know that whenever the symptoms are such as to indicate a tendency to spontaneous cure, compression will assist in completing it. Thus, when the tumour, at the same time that it is large and firm, and not beating strongly, is neither painful nor discoloured, general compression, judiciously employed, will prove a most beneficial auxiliary in the cure. Nay, even where the aneurism is only in its incipient stage, general compression, although it will not be so certainly successful, is not without its advantages. Indeed, it never does harm, if not productive of much pain, which, along with an increase of numbness, ought to be considered as monitors to desist. It need hardly be observed, that where the swelling is inflamed, painful, and diffused, its use can never be permitted; it would, if employed in such circumstances, aggravate the disease it was meant to cure.

In using general compression, our intention is in no case to induce or increase inflammation, which would, almost to a certainty, terminate in gangrene. On the contrary, the object we hold in view is to produce coagulation of the blood

in the sac, and thus to cut off the aneurismal cyst from any share in the circulation. If this be accomplished, the absorbents will soon perform their part of the process. They will slowly remove both the sac and its contents, leaving, in the end, in the place where the tumour had been, a small, generally oblong, hard knot, free of pulsation.

Compression, however, to be useful, must be prudently applied, and skilfully managed. The mode employed by some, of merely fixing a firm compress and tight roller over the tumour, deserves the strongest reprobation. It is unscientific, and besides, exceedingly injurious. Consider that pressure employed in this way is infinitely more painful than even the operation; that it is completely ineffectual; and uniformly, if persisted in, is productive of disagreeable consequences; and few, I am persuaded, will be inclined to risk its use. If the compression, when it is thus partially employed, be carried to that extent which would be required to affect the tumour or the artery, the functions of the veins, nerves, and absorbents, must suffer. The veins and lymphatics will soon be distended, œdema will supervene, the limb below the point of compression will swell, and be rendered torpid from the pressure on its nerves; it will narrowly escape falling into gangrene. Is this a condition which one would suppose conducive to the establish-

ment of a new course for the circulation? Or can we reasonably entertain a hope, that in this situation the anastomosing vessels shall regularly discharge their duty?—Surely not.—Pressure used in a partial manner, never can do good, but will often do much harm. Let it, therefore, be abandoned; for discredit has, I believe, been brought on the mode of cure, by general compression, merely from the injudicious way in which it has been employed, or from making use of it in improper cases.

It has already been mentioned, that if the tumour be circumscribed, the surface not discoloured, and the parts not painful nor tender when touched, we may, even although general compression will not accomplish a cure, gain some advantage from using it. We are next to inquire how it is to be employed.

When general compression is to be employed, we begin by applying the roller in the usual way to the extremity of the member, and we continue it of equal tightness up to the lower part of the tumour. When we have thus far applied it, we place a compress over the swelling, and over this we apply the bandage, encircling the member up to the joint above where the disease is seated, but pulling it less tightly the higher we go. This is really all that is required, although some advise the affusion of vinegar and water, or of medicated waters over the bandage and compress. These

we never, however, require, unless where the surface, from the continuance of the pressure, becomes fretted. This is not an unfrequent occurrence, neither is it very prejudicial, except where it is conjoined with deep-seated acute pain in the tumour, and increased numbness of the parts below the swelling; in which case, the compression must be laid aside.

The great difficulty of obtaining a cure by general compression, arises from the length of time it is absolutely necessary to continue its use, and the privations to which the patient must submit during the cure. Even where the tumour decreases under its use, nay, where it has even become as small as a bean, and has ceased to pulsate, the bandage, to insure success, must be continued for weeks, during which time the patient must refrain from active exertion with the affected member, must be placed on a rigid antiphlogistic regimen, and must submit to bleeding and purging at short intervals. This catalogue will be sufficient to deter most patients from submitting to this mode; none but those who are too timid to undergo an operation, will choose to endure the protracted hardships of this discipline; and few, even after they have given their consent, will have sufficient perseverance to proceed. From these and other causes which have already been hinted at, we shall not be surprised, that comparatively, few

cures are on record effected by general compression.

When the ligature was first introduced in the treatment of aneurism, the practice was conducted without principle; it was founded on a combination of experience and mechanical reasoning, and employed altogether without any regard to the causes which would insure its success, or occasion its failure. The mode even of performing this operation, was at first rude and defective; nor when it began to be improved, was the progress of amendment by any means rapid. Instead of viewing the operation in all its relations, and detecting and correcting, at once, all the improprieties in its performance, each inquirer merely added a little to the information collected before his time. This slowness in improvement, in a great measure, depended on overlooking the connexions and relations of the arteries to the neighbouring parts in a state of health; and especially to surgeons having obtained no precise ideas, respecting the way in which the coats of the vessels themselves are nourished. We shall, in tracing the progress of the ligature, see many proofs of the operator, for want of this knowledge, having defeated the very end he had in view.

Surgeons, till lately, considered the application of a ligature to an artery, as a mere mechanical, and consequently a very simple operation; but the experiments of modern physiologists have clearly

proved that the operation for aneurism, is one of the nicest in surgery, involving in its performance, the combination of accurate anatomical and physiological information. Let no one, therefore, attempt its execution, till he has, by diligent study, made himself thoroughly acquainted with all the facts which are to regulate his conduct. Let him not consider it enough that he can safely cut down to an artery, and pass a thread round it, for this the ancients could do as dexterously as most of the moderns; yet the records of surgery show, that in this very operation, the early performers of it much oftener failed than we do. The reason of this difference will be best explained, and easiest understood, if the effects resulting from the application of a ligature to an artery, and the causes of secondary hæmorrhage, be first pointed out.

Dr. Jones, who has written a most able treatise on these subjects, conceives that the first effect produced by the ligature, is a division of the two internal coats of the artery, by which such a degree of inflammation is brought on, as must be followed by the effusion of organized lymph between the coat of the artery and around it. Sometimes, but not uniformly, a clot of blood is formed in the canal of the vessel above the thread, "But the formation of this coagulum is of little consequence; for soon after the application of the ligature, the extremity of the artery begins to inflame; and the wounded internal surface of its

canal being kept in close contact by the ligature, adheres and converts this portion of the artery into an impervious, and at first, slightly conical sac."* "After a short time, the ligature occasions ulceration of the part around which it is immediately applied; and acting as a tent, a small aperture is formed in the layer of lymph, effused over the artery; through this aperture a small quantity of pus is discharged, so long as the ligature remains; and finally, the ligature itself also escapes, and the little cavity which it has occasioned, granulates and fills up, and the external wound heals in the usual manner, leaving a considerable thickening and induration of the cellular membrane, extending a little beyond the extremity of the artery."† This thickening and induration gradually disappears. "The portion of the arterial trunk which has been tied, undergoes a gradual contraction and obliteration to the first collateral branches, and finally dwindles to a mere fibre.

"The collateral branches are unusually distended, and excited to stronger action, from the moment that a complete obstruction is formed in the trunk, and consequently the commencement of their enlargement may be referred to that period. Their increase of size seems to be proportioned to the exigence of the particular case;

* Jones, p. 160. † Jones, p. 161.

thus, if the limb has been amputated, it does not appear to be very considerable; but if the limb remain entire, and only the natural course of the circulation be obstructed through the main arterial trunk, their enlargement is much more conspicuous, and is particularly observable in the small inosculating ramifications of the collateral branches, by which the circulation appears to be carried on, after a certain time, as vigorously in the limb, the principal artery of which has been obstructed, as in that which has preserved its circulation.

"The effects of tying an artery properly, appear then to be the following:—

"1st. To cut through the internal and middle coats of the artery, and to bring the wounded surface into perfect apposition.

"2dly, To occasion a determination of blood on the collateral branches.

"3dly, To allow of the formation of a coagulum of blood just within the artery, provided a collateral branch is not very near the ligature.

"4thly, To excite inflammation in the internal and middle coats of the artery, by having cut them through, and consequently, to give rise to an effusion of lymph, by which the wounded surfaces are united, and the canal is rendered impervious; to produce a simultaneous inflammation on the corresponding external surface of the artery, by which it becomes very much thickened with effused lymph; and at the same time, from the

exposure and inevitable wounding of the surrounding parts, to occasion inflammation in them, and an effusion of lymph which covers the artery, and forms the surface of the wound.

"5thly, To produce ulceration in the part of the artery around which the ligature is immediately applied, viz. its external coat.

"6thly, To produce indirectly a complete obliteration, not only of the canal of the artery, but even of the artery itself to the collateral branches, on both sides of the part which has been tied.

"7thly, To give rise to an enlargement of the collateral branches."*

The celebrated Desault had observed many years ago, that on tying a ligature pretty firmly round an artery, the "*tissu arteriel*" and internal coat were both cut.† The same fact was also

* Jones, pages 163, et seq.

† It may, perhaps, to some, be necessary to explain what is meant by "*tissu arteriel.*" By dissection, an artery may be shown to consist of four coats. The internal is membranous, and highly polished; the next is firm and fibrous;—the third is membranous;—and the fourth or outermost, is loose and shaggy. In describing the structure of an artery, Dr. Jones divides the coats into an internal, middle, and external, describing in this way, the membranous and shaggy coats, as forming parts of the external coat.

The outermost coat is composed of thin plates, attached to each other by shining filaments; by these it is likewise connected to the neighbouring parts. This coat, which is shaggy, extremely loose, and composed of cells, containing in the young animal, a serous fluid, but in those advanced in life an oily matter, is really the cellular coat of an artery. This coat is peculiarly adapted for facilitating the motions of the vessel, and for conveying to the deeper-seated coats, those little arteries which are to nourish them.

pointed out by Dr. Thompson, and by Bichat, who observes, "on peut l'observer, en liant un peu fortement une artere les deux tuniques internes sont coupees; la celluleure seule soutient l'effort de la ligature, qui cependant lui est immediatement appliquée; on observe en ouverant l'artere une section correspondente au fil, exactment semblable a celle qu'auroit faite un instrument tranchant.

"J'ai repété souvent cette experience, indiquée

The coat next to the cellular is firm, compact, filamentous, and so dense, that it was named by Vesalius the membranous, and by Senac, the tendinous coat. It is truly of a membranous structure, and is so strong, that a force which lacerates the coats beneath, makes little impression on it. On this coat an artery chiefly depends for its longitudinal strength. By its elasticity, it serves, as Dr. Jones very justly remarks, in some respects, the purpose of a strong fascia.

The third coat, or "*Le tissu arteriel*" of Bichat, consists of many strata or layers, which can be separated from each other, and which are found to be composed of circular fibres.

These fibres vary in their colour in different subjects, and at different periods of life. In young subjects, pale red fibres predominate, but in aged bodies, those of a yellowish colour are most numerous. The "*tissu arteriel*" is a texture peculiar to arteries, there being nothing similar to it found in any other part of the body.

The internal coat is very thin, transparent, and entirely without distinction of fibres. On its inner surface it is highly polished; but on its outer surface, it is less smooth, being connected by pellucid fibres to the "*tissu arteriel;*" yet the union is so very slight, that these coats can be easily detached from each other, without perceptible laceration of the proper texture of either. Along its whole extent, this coat is elastic, and in the longitudinal direction, stronger than we would suppose; but it is "so weak in the circular, as to be very easily torn by the slightest force applied in that direction."*

Neither the tissu arteriel, nor the internal coat have any cellular texture entering into their composition.

* Jones, page 1.

par Desault soit sur le cadevere, soit sur les animaux vivens; son resultat est fort constant."*

From this fact and his own experiments, Dr. Jones has been led to consider the division of these coats by the ligature, an essential part in the operation, one without which obliteration would not take place. By many it will be considered presumptuous in me to attempt a refutation of this conclusion; yet I cannot, to my own satisfaction, reconcile this doctrine with facts which we have daily an opportunity of observing. Do we not every day see the whole tract of the umbilical artery, from the side of the bladder to the navel, obliterated? Now, what produces this obliteration? Some may reply, the ligature tied round the chord in the human subject, or the gnawing of the chord in the lower animals; but does this explanation apply to the ductus arteriosus?—Surely not. Others may assert, that it is wisely provided by nature, that these vessels when they cease to be useful, should be obliterated; but this explains nothing, our wish is to learn how they are obliterated. We trace the same smooth and shining membrane along them as along other parts of the vascular system; yet we see that without division of this, the ductus arteriosus is almost uniformly converted into an impervious and ligamentous-looking chord. What is there to prevent the same from taking place in other arteries?

* Bichat Anatomie Generale, tome 2d. p. 181, et seq.

Some speculation has, I suspect, crept into the reasoning of Dr. Jones on this point, and this has, I suppose, led him to the inference, that division of the two internal coats is absolutely required to procure obliteration. To me it does not appear that his facts warrant this conclusion; they rather seem to show that division of these coats does not prevent obliteration, than that it assists in completing the process. At all events, the obliteration of the ductus arteriosus, proves that adhesion of the sides of an artery does take place, without division of its internal coats. This is corroborated by observations made on external vessels. I have in my possession a preparation, in which about two inches of the common and superficial femoral arteries are obliterated. This extensive obliteration I discovered accidentally, when dissecting the limb of a man, whose leg had been amputated above the knee many months before. The obstructed part was seated just about the spot where the vessel must have been pressed on by the tourniquet; but it cannot be determined that the obliteration was produced by the compression made by that instrument. It has evidently no connexion with the application of the ligature; for between the obliterated portion and the part acted on by the thread, there was a considerable extent of pervious vessel, into which the blood was conveyed by an enlargement of the anastomosing branches of the posterior pelvical

arteries. In the humeral artery I likewise found a similar obliteration, without any external cicatrix, or any matting of the parts around the vessel, which certainly proved that the obstruction had not been produced by any agent directly acting on the vessel itself.

From the almost uniform obliteration of the ductus arteriosus and umbilical arteries, and from the occasional cases which are met with, similar to those mentioned of the femoral and humeral arteries, it is allowable to conclude, that without laceration of the internal coats, adhesion of the sides of a vessel may be procured, provided the flow of blood along its canal be interrupted. This will be accomplished by merely keeping the sides of the artery in contact; for the pressure required to do this, will, generally, if the vessel be healthy, excite such a degree of increased action, as will end in the effusion of organized lymph. On this subject, which is not devoid of practical interest, we have the corroborative testimony of Bichat, whose observation is made without any reference to a particular hypothesis, or to the point under discussion. His remark is, "Arteres privees de sang contractent des intimes adherences par leurs surfaces internes."*

Several months after the preceding remarks were written, and after they had been read both

* Bichat Anat. Gen. tome 2d, p. 291.

by my brother and by Dr. Brown, Mr. Charles Bell published the third edition of his System of Dissections. Although in this he has anticipated me, I feel much pleasure in corroborating what I have written, by Mr. Bell's observations. This author says, "In the first place I deny that cut surfaces adhere more readily than a natural surface, in a state of inflammation. The effect of the ligature ought to be inflammation of the coats of the vessel, and the preservation of the inner surface in contact. Much as I admire the ingenuity of Mr. Jones, yet an experiment has been made in my room, which throws more light on the subject than twenty experiments of cutting the artery. A ligature was put about an artery quite loose, and without obstructing the blood, in due time the clot was formed, and the coagulable lymph thrown out, and the artery obstructed. Yet, from fifty such experiments, uniformly successful, it would be madness to say, that in tying an aneurismal artery we were not to draw tight the ligature, but only leave it there surrounding and causing inflammation of the artery. I conceive it little less rational, because cutting the inner coats of an artery in brutes, is followed by the closing of the artery, to say, that in an operation of aneurism we were to draw the ligature till we felt the giving way of the inner coats."*

* Bell's Dissections, third edition, vol. 1st. pages 140, 141.

The conclusion which I have drawn from the facts before me, is further supported, by attending to the effects produced by ligature of an artery. It is not only the part cut by the thread which adheres. The truth is, we really find the sides of the artery adhering to each other, up to the origin of the first lateral branch, although that should not happen to come off, for an inch or two beyond where the ligature has been applied.

Scarpa, in dissecting the artery of the thigh after amputation, found the "*tissu arteriel*" thicker than usual, and the internal coat of a bright red colour, covered for a considerable extent by a lymphatic exudation; on removing which, the coat itself was found pulpy, villous, very vascular, and in an apt state for adhesion. Now, if the internal coat can undergo these changes, and adhere where not acted on by the thread, it is certainly fair to suppose, that its division is not essential in procuring the obliteration. This, to my apprehension, is fully proved, by the obliteration of the canal of the artery, for some way above and below the sac, in cases of spontaneous cure of aneurism. The ligature, I suppose, does no more than by its irritation, excite such an increased action in the vessel, as shall occasion the secretion of organized lymph. The same may be done by bruising it, or by loosely placing a thread round it.

There is a part of the process of obliteration which must be attended to; I mean the clot of blood, which is sometimes formed in the vessel. If we view this in its proper light, we shall have occasion to admire the office it performs. Bichat has shown, that naturally no absorption goes on from the inner surface of arteries. Nature has, therefore, increased her own task, by forming a bloody clot. Unless it performs a part in the process, its presence must be detrimental, since it must be removed before adhesion can take place. Where it is found, such a change must afterwards be induced, in the nature of the internal coat, as shall adapt it for removing by absorption the extraneous substance. The accomplishment of this also renders the aptitude for adhesion greater.

A coagulum, as we learn from Dr. Jones' experiments, is chiefly formed where the distance from the ligature to the first lateral branch is considerable. Where the distance is short, the ligature excites a sufficient degree of irritation to produce the lymphatic effusion; but where it is considerable, that part in the vicinity of the thread is sufficiently excited: not so the more remote part. From the natural effect of the stagnation of the blood, a coagulum is formed, which being an extraneous substance, excites the action of that part of the canal of the vessel with which it is in contact, procures its own absorption, and at the same time causes an effusion of organized lymph. This

is really the only benefit which can be derived from the formation of a coagulum; and its presence, under these circumstances, shows that all that is required to produce obliteration, is a certain degree of irritation, applied to a healthy artery. If this be brought about, the adhesion will be complete.

When we examine an artery a considerable time after it has become obliterated, the "*tissu arteriel*" is found, as well as the lymph, which was originally effused between the coats and round the vessel, to be completely removed by absorption. The obliterated portion is converted into a ligamentous looking chord, composed of longitudinal fibres, among which we cannot discern a single circular fibre. By care, we can generally, for a short way along the impervious chord, trace the internal coat, shrunk indeed, and thinner than before.

Frequently the ligature fails to produce the desired effect. In place of inducing healthy actions, tending by their combination, to produce obliteration of the canal of the artery, it acts as an exciter of disease, which defeats the end of operation. No point is more worthy of being fully investigated, than the causes giving rise to secondary hæmorrhage; and there is no department of surgery, in which we have to acknowledge more obligation to any individual, than we have in this to Dr. Jones. Indeed he has so ably pro-

secuted this inquiry, that he has left but little for any of his successors to add to his information.

This author justly observes, that our object is to heal by the first intention; he applies the ligature for the express purpose, as he says, of wounding as with a clean cut, the internal coats of the vessel. This, in his estimation, is the primary object in using the ligature; the secondary, is to preserve the edges of the wound in accurate contact. Having set out with this principle, he proceeds to the enumeration of the circumstances, rendering the ligature a preventive of union by the first intention. The first he mentions, is an irregularity in the form of the ligature, by which it acts more on one part, than on another, whereas, to produce the proper effect, the internal coats ought, in his opinion, to be regularly, fully, and equally divided. "Although the internal surface of the artery appeared inflamed, a little way above the part at which it adhered, yet, in no instance did it exhibit the appearance of lymph having been effused on it, except at the part which had been cut, and the point of adhesion was never more than a line's breadth; in short, the artery seemed to adhere only at its cut surfaces."* How is this to be reconciled with Scarpa's dissection of the femoral artery, formerly noticed? and how, with the well established fact, that the canal

* Jones, page 169.

of the vessel is obliterated much above the ligature?

There are many circumstances which would lead us to believe, that Dr. Jones has erred in the explanation which he has given of the fact, that an ill formed ligature prevents obliteration of the artery. We can easily, independent of Dr. Jones' idea, comprehend how an unequal ligature will frustrate the end for which it is employed. The adhesive inflammation is a delicate process, one which will be equally injured by too high or too low a stimulus. If an uneven thread be used, the inflammation excited runs, perhaps, too high, or on the other hand, if the vessel be torpid, which frequently happens in aneurismal patients, a sufficient action is not brought on. But all this is independent of what Dr. Jones supposes, being totally uninfluenced by the internal coats being either cut, or the reverse.

Indeed, the tying of an artery in aneurism, is in no respect different from tying it after amputation. In the latter case, the ligature is applied by wise men and fools, and in every possible way that can be conceived; yet it does not fail to produce adhesion, perhaps once in a thousand instances. In aneurism, secondary hæmorrhage is frequent, but it is surely to be attributed, in most cases, to improper treatment of the vessel, or to a diseased state of its coats. The same ligatures which succeed after amputation, fail in aneurism,

which unquestionably implies that the fault lies not in the thread, but either with the operator or the vessel.

Were the internal coat of an artery possessed of cellular tissue, the process of adhesion would not be so ticklish. When we failed to procure re-union by the first intention, it might be accomplished by granulation; but Bichat has shown that the formation of granulation is a property not possessed by the internal coats of arteries. When, therefore, re-union by the first intention is lost, all is lost. A knotty thread, improperly applied, irritates the artery to which it is applied, beyond the degree requisite for the secretion of organized lymph; acute inflammation is excited, which is soon followed by ulceration. But as the inner coats of arteries possess no power of forming granulations, subsequent adhesion cannot be expected. The vessel beyond the ligature gives way and secondary hæmorrhage takes place.

The way in which the artery itself is treated, at the time the ligature is applied, is another frequent cause of secondary bleeding. By Dr. Jones it has been ascertained, that the coats of arteries depend for their support on the small vessels, which are traced creeping among the meshes of the outer layer of the external coat. He has also satisfactorily demonstrated, that these are derived from the branches in the vicinity, and has proved that each individual part of the artery is

supplied by its own appropriate vessels, which do not freely anastomose with those above or below. Having established these facts, he drew this fair practical inference from his data: that an insulated part of the artery being deprived of its vascular connexions, and fairly detached from its nutrient twigs, is almost certain to die, and thence to separate, in a few days, from the still living, but inflamed part of the vessel. To prevent this, which had formerly been the bane of the operation, he advised, that uniformly the thread be tied as nearly as possible to the part where the vessel is still adhering. If it be done otherwise, it is evident that the obliteration of the vessel must be very precarious, it can only be accomplished by the insulated part of the artery being instantly almost laid in contact with the neighbouring parts, to which it will adhere, perhaps, as often as a tooth transplanted into a cock's comb will. In this way, in a small proportion of cases, obliteration may take place, but much oftener it will fail to be accomplished.

"When we consider that the arteries receive their vessels from the surrounding cellular membrane, it must be evident, that if we deprive them of those vessels, they cannot undergo those changes which depend on vascularity, viz. inflammation and adhesion; and, consequently, the ligature cannot produce those effects on which the success of the operation depends, but the portion of

artery dying, bursting, or sloughing, hæmorrhage takes place. If the ligature be applied on the centre of the detached portion of the artery, when the artery gives way, the hæmorrhage will proceed both from the upper and the lower portions; but if it be applied on the vessel at its connexion with the surrounding cellular membrane, either above or below, the hæmorrhage will then proceed from only one part of the artery, which will be that which has the detached portion of the artery for its extremity. As the hæmorrhage will supervene, as soon as the smallest part of the artery has given way, of course it will frequently return, and perhaps, even prove fatal, before the artery is divided into two distinct portions; and hence we almost always find the secondary hæmorrhage described as issuing from the artery immediately under the ligature."*

Secondary hæmorrhage is often dependent on the formation of sinuses along the course of the artery. These, when extensive, insulate the vessel as effectually as the fingers of the surgeon; they deprive its coats of their nourishment, they consequently give way, and profuse bleeding takes place. This cause of secondary hæmorrhage is especially apt to occur, if there be diseased glands round the vessel. When these suppurate, the artery is detached, or the ulceration penetrates into its cavity. The case of inguinal aneurism,

* Scarpa, p. 269.

first operated on by Mr. Abernethy, affords a good illustration of this species of secondary hæmorrhage.

Taking up too much surrounding substance along with the artery, is another cause giving rise to secondary hæmorrhage. At the moment of tying the ligature, the proper degree of irritation is not applied to the vessel, and by the shrinking of the parts the pressure on the artery is not kept up for a sufficient length of time; the artery begins again to allow blood to pass through its canal, and the formation of organized lymph is prevented. I suspect that this cause of secondary bleeding will chiefly have effect where the artery is torpid.

There is also another way, in which including some of the parts in the vicinity, may tend to prevent obliteration of the artery. It is a well known fact, that a nerve, if taken in, prevents for a great length of time the separation of the thread. If, therefore, we have included one, the ligature remains long a source of irritation, at the extremity of the vessel. The surgeon also is often tempted to pull at it, endeavouring to bring it away. It cannot be a matter of wonder that these causes, conjoined, should excite acute inflammation in the parts acted on, followed by ulceration, nor that this should eventually, in some cases, penetrate into the vessel above where it is obliterated.

Where the hæmorrhage arises from the shrinking of the parts included in the ligature, it occurs shortly after the operation, but where it is dependent on a nerve having been included, it does not take place for days or weeks. The production of secondary hæmorrhage is, I believe, the chief bad effect which will generally result from including a nerve; although some are to be found who assert, that this almost uniformly gives rise to convulsions, which is by no means the case. At the same time, that I would not, on that account, dread, as some do, the taking up a nerve along with the artery, still, I cannot look on including a nerve to be immaterial, notwithstanding the authority of Scarpa, who, in speaking of applying a ligature to the femoral artery, observes, that the nervous twigs may be separated, in laying bare and detaching the vessel from the cellular membrane; "or if they even remain along with the artery, included in the ligature, the loss of them has no material influence in relation to the sensation of the lower extremity."*

There are other causes, besides those enumerated, which give rise to secondary hæmorrhage. The ligature, in some cases, slips from the artery, and the bleeding begins before the patient is removed from the table. Dr. Jones observes, that surgeons have always excused themselves when this happened, by saying, that it was dependent

* Scarpa, page 269.

on the violent impulse of the blood, against the tied end of the artery. His experiments prove this to be a mistaken notion. We have certain information from them, that very soon that portion of the vessel between the ligature and the first lateral branch ceases to pulsate at all; nay, even where the distance between them is considerable, the blood, from stagnation, soon coagulates. The impulse of the blood, cannot, then, in general, be the cause why the ligature slips from the vessel. Dr. Jones more rationally explains this, by supposing it to have arisen "either from the clumsiness of the ligature, which prevented its tying compactly and securely round the artery; or from its not having been applied tight enough, lest it should cut through the coats of the artery too soon; or finally, from its having that very insecure hold of the artery, which the deviation from the circular direction must necessarily occasion." It is obvious, that these causes may be variously combined in the same case; and if one be adequate to occasion the slipping of the ligature, how much more likely is that event to happen, when they are so combined?

I have known one instance, where the surgeon tied the sheath formed in the substance of the triceps muscle, mistaking it for the femoral artery which had retracted itself. In this case, the ligature, maintained its place so long as the patient lay in a fainting state on the table, but so soon as

he was put to bed, it was forced off, and the bed was deluged with blood. Indeed, the life of the person was only saved by the use of the tourniquet; by undoing the dressings, exposing the face of the stump, clearing away the clotted blood, and slitting up the sheath of the artery so far, that a tenaculum could be fairly thrust through the coats of the exposed vessel.

These causes, by attention, may be obviated; where, therefore, they operate, the surgeon is blameable for the way in which he has applied the ligature. It appears to me, that the only way in which the slipping of the ligature can take place, without being imputable to the surgeon, is, when the internal coat, "*tissu arteriel*," and inner layer of the external coat are greatly diseased. In such a case, the surgeon, while detaching the artery from the neighbouring parts, may strip off the external loose and shaggy covering; or even should this be left, on tying the thread, all the diseased coats will be divided, the blood will instantly distend the cells, and escape from the meshes of the spongy outer covering; or where this has been stripped off, the stream will flow from the gaping orifice of the vessel itself. We have reason to be satisfied that these are the chief causes which occasion slipping of the ligature; and if this be admitted, there can surely be no propriety in attempting to prevent its detachment by stitching it to the vessel, as has been

lately proposed. Such a plan cannot, in any case, add to the security; for it cannot, where the ligature would be detached, prevent this from happening; and when this would not happen, it must be a superfluous precaution, one which, as it can never be required, ought never to be employed.

Even where the artery is not so much diseased as I have been supposing, still if it be not perfectly healthy, although it may, for a few days retain the ligature, adhesion will not take place. Hence, in aged people, in whom this alteration from the natural state is very frequent, obliteration is more rarely obtained than in young patients. I believe, that this deviation from the healthy structure, is not only a direct cause, preventing adhesion where an artery is tied, but also that it indirectly prevents the obliteration. It is now certainly ascertained, that the circulation along that part of the vessel which is between the ligature and the first lateral branch, ought, in the course of a very short time after the application of the ligature, to be completely cut off. This is produced by the contraction of the artery by its muscular power, till at last, where the distance is short between the thread and the first branch, its sides are brought into accurate apposition. This contraction of the vessel, and the excitation of such an increase of action on its inner surface, as shall procure a due secretion of organized lymph,

are indispensable to the perfect obliteration of its canal; but as neither can be accomplished where the internal coats are in a morbid condition, so adhesion, and consequent obliteration, cannot, under such circumstances, be effected. Sooner or later, secondary hæmorrhage will take place. Secondary hæmorrhage, from this diseased state of the coats of an artery, Mr. C. Bell says, will generally take place "during the period from the tenth to the fifteenth day after the operation."*

Dr. Jones mentions among the causes of secondary hæmorrhage, premature exertion of the patient, producing rupture of the newly formed cicatrix; but this, I imagine, can only happen where the ligature has been applied very near to a lateral branch. In that case, I can suppose, that from the small portion of the artery which has been obliterated, especially if its extremity be not supported by granulations from the surrounding parts, an increased impetus of circulation may burst open the slender adhesion. It must, however, be confessed, that the occurrence is just within the verge of possibility.

The effects resulting from the application of a ligature to an artery, and the causes giving rise to secondary hæmorrhage, having been now attended to, we are in the next place to trace the history of the various modes of operating for aneurism, at

*Bell's Operative Surgery, vol. i. page 82.

least, in so far as this is necessary to illustrate the causes tending to occasion failure of each of these, and to enable us to determine which is the preferable plan of operating, or the one least subject to be followed by secondary hæmorrhage.

I would conceive it nearly a waste of time to describe the modes of operating adopted by our ancestors, at least minutely. Suffice it to say, that they all had a notion that it was necessary to cut on the sac, and tie the artery at its entrance into, and passage from the cyst; nay, some before they did this, tied the artery with a double ligature, a considerable way above the tumour; some fairly dissected out the sac, while others were satisfied with opening it, removing its contents, and allowing it to slough off, or be removed in the way most agreeable to nature. Such operations, however, it is demonstrable, could seldom succeed. The parts operated on, were, from their morbid condition, prone to disease; obliteration of the canal of the artery seldom took place; secondary hæmorrhage generally followed the operation, or large and extensive sloughs were cast off, profuse suppurations succeeded, the sore was long of granulating, and even where after great risk and protracted suffering, a cure was obtained, recovery was imperfect, for the limb was much injured. No wonder that surgeons should have generally declined this operation; for as performed till the time of Anel and Hunter, its advantages were

fully counterbalanced by its inconveniences. The improvements of the day, or as they ought to be called, the alterations, added to the danger of the operation. They were the offspring of erroneous notions, and imperfect anatomy.

If ever we are to attain to uniform, or nearly uniform success in our operations, it must be by having investigated and obviated the causes of failure. Many surgeons have misapplied that time in the invention of new instruments, which ought to have been devoted to the study of the causes producing secondary hæmorrhage. This cannot be more completely illustrated, than by reviewing the plans devised by our forefathers, to prevent the occurrence of that accident. They had recourse to mechanical contrivances, to accomplish an object which could only be attained by a more correct knowledge of the structure of the parts operated upon. They frequently witnessed secondary hæmorrhage, and no wonder, considering the way in which they treated the artery, and the high irritation they excited in its vicinity. Their ignorance, however, led them to employ means which would have a diametrically opposite effect from the one intended. They introduced threads of reserve, a practice, which, I believe, originated with Paulus; but these, so far from answering the purpose for which they were used; were really a source of imminent danger. Their employment could not be justified by a single

reasonable argument. Mechanical speculation introduced them, and the eager anxiety of the surgeon to assist nature, kept up the practice.

It was hardly reasonable, however, to suppose that the clumsy means which were often employed, would really aid the actions of the living system. The promoters of such practices would have done wisely, had they recollected, in the performance of their operations, and in their endeavours to assist nature, that whatever is not alive must retard, in place of expediting the cure. Hence it comes, that the reserve ligatures, the quills, the leather, and the silver pads, and numerous other machines, contrived by the French surgeons, so often failed. In fact, they increased the evil they were intended to remove. This may be proved by reviewing the records of surgery, which are filled with cases of secondary bleeding, and new and mechanical contrivances introduced to counteract the evil. This, however, was not the way to lessen the danger, nor could the invention of such instruments be considered as improvements in our art.

The first real improvement of this operation was brought forward about the commencement of the eighteenth century by Anel. In his operation, two ligatures were tied on the artery, contiguous to each other, and the tumour was left to decrease by operations carried on within itself. As the agency of the absorbent system was not

understood in the early part of that century, we cannot wonder that Anel should have explained the mode in which the tumour was removed by nature, on false principles; nor is it matter of surprise, that he should have ascribed to another and imaginary power, what was really due to the lymphatics.

Anel does not seem to have proceeded on any fixed principle in this operation, which appears to have been only a modification of the plan pursued by Etius, who first tied two ligatures round the vessel, a considerable way above the tumour, and then divided the artery in the space between them; had he rested here, his operation would have been as perfect as the present one, of which it is, indeed, the rough original. When, however, he had performed this, which was all that was really required, he proceeded to operate on the tumour, which no one, in his time, could believe would be removed by the efforts of the system itself; their knowledge of the animal economy did not extend thus far, nor were they certain how the limb was to be supported after the main artery was tied. The notions of medical men were, on this subject, highly absurd, till the time of Mr. Hunter.

One can hardly conceive, now that he knows the certainty introduced into this operation, the feelings which agitated our ancestors, when about to enter on its performance. They were ignorant

of the great and striking effects produced by vascular inosculation; and they would have started, had they been told, that their sole dependence ought to be placed on the delicate ramifications of arteries,—the minute inosculating twigs, for the support of the limb beneath, after the operations for aneurism. We now place no reliance on the supposititious and unusual branches of the older surgeons; we have no faith in a high division of the main artery being at all necessary to the safety of the limb. We have this superiority over our ancestors, that we know by experience that the power of the anastomosing arteries is great; we place our trust in them; we do not now proceed with fear and trembling to the operation for aneurism, and wonder at our success—we enter on it boldly, and convinced of the resources of the system, we, without hesitating, tie the large artery of any limb, and yet have little dread of the member dying from want of nourishment. This, although much dreaded by those who have gone before us, is not the source of danger in this operation, which has already been shown to arise principally from secondary bleeding, which the ancients ineffectually attempted to prevent by their mechanical inventions.

We are now to attend to this operation as modified by Mr. John Hunter, whose chief improvements in surgery, and in the operation for aneurism, in particular, arose from his extensive

anatomical knowledge, and from his unremitting attention to the animal economy. He was indeed, the introducer of several new modes of operating; but he was the inventor of few instruments. I have already mentioned the state of this operation at the time Mr. Hunter began to practise surgery; and with the exception of the single operation performed towards the beginning of the eighteenth century by Anel, it has been seen in a rude and defective state. Those who view with an impartial eye, the records of surgery previous to the time of Mr. Hunter, must be convinced that much of our present success is justly to be attributed to the labours of that distinguished pathologist. Some may here say, that Anel laid the foundation of our practice; but this, on reflection, can hardly be admitted, since, although Anel did really perform an operation similar to the one introduced by Mr. Hunter, yet his practice was soon forgotten, chiefly, because not fully and scientifically explained even by himself. Mr. Hunter, on the other hand, showed that one principal cause of failure, was secondary hæmorrhage, which, in his opinion, was occasioned by tying the artery too near the seat of disease: A morbid part of the vessel was acted on, obliteration of its canal, for reasons already explained, seldom took place. He being convinced, that want of success depended on this cause, proposed taking up the vessel at some distance from the tumour, at a

part where we might naturally expect it to be in a healthy state. He acted on this idea, but although he was rather more fortunate than those who had gone before him, still he could not boast of complete success; secondary hæmorrhage was a frequent occurrence; still, therefore, the operation was thus far defective.

Mr. Hunter was most assuredly the first who proceeded on rational principles to improve the operation; but it may be worth while to explain why he failed to bring it to its present perfection. In the first operation which he performed, which was in the year 1785, he detached a considerable part of the vessel from its nutrient twigs, and then he tied four ligatures round the detached part, but the one farthest from the heart being only pulled tight, was really the ligature which cut off the circulation; the other three were reserve ligatures. This statement is of itself a sufficient explanation why hæmorrhage took place; and if he afterward abandoned the reserve ligatures, still he gained but little, for he continued to insulate too much of the artery—he applied the thread on a part deprived of its circulation.

Mr. Hunter's plan, therefore, only obviated one cause of failure, that dependent on tying a diseased part of the artery; it left the other causes as liable to operate as formerly. But Mr. Hunter did a great service, by proving that there is no propriety in touching the tumour. He showed,

that of herself, the system is competent to procure its removal, after the circulation through it was cut off; and he clearly demonstrated, that this office was performed by the lymphatics. This, of itself, was a material point gained. Mr. Hunter can readily be excused for not having accomplished more, when it is remarked, that till after his time, Dr. Jones' experiments were not performed. While, therefore, this furnishes an apology for Mr. Hunter, it leads me to mention that Dr. Jones and Dr. Thomson, by their ingenious experiments on the arteries, and fair deductions from these, have brought the operation, nearly, we presume, to its ultimate perfection.

Professor Scarpa has made some alterations on the Hunterian mode of operating, which must be next examined. As his own account of these is sufficiently concise, I shall make no apology for transcribing his own words. "Of all the steps of this operation, the following points deserve particular attention." Some preliminary observations, as relating to popliteal aneurism in particular, I omit. "2dly, The manner of insulating the artery from the cellular substance, with the point of the finger, rather than with a cutting instrument, in order to prevent, in this way, the division of any collateral branch; and the insulating the artery only in that place which is required for the application of two ligatures near to each other, and of a cylinder of linen corresponding exactly

to the breadth of the point of the finger, or a little more. 3dly, The ligature, by means of two waxed tapes of convenient breadth, placed behind and round the artery, near to each other, with the interposition of a roll of linen of a cylindrical form, between the artery and the knot. 4thly, The express omission of the ligature of reserve. 5thly, The giving the preference to the single, rather than to the double, or surgeon's knot. 6thly, The unremitting attention, during the subsequent cure, that the lips of the wound do not approach too near; and still more, that they do not adhere together, before the ligatures and the roll of linen are expelled from the bottom of the wound, and till the bottom of the wound has risen nearly to a level with the integuments. 7thly, The timely incision or counter opening in the case, although it is not frequent, of an abscess forming in the vicinity, or along the course of the artery, occasioned by the portion of cellular substance surrounding the artery passing into mortification."

This is a correct outline of the practice of the Italian professor; yet high as his authority is, to most who are acquainted with Dr. Jones' experiments, many parts of his practice must appear objectionable. What difference is there between a roll of linen laid along the artery, and a ligature of reserve placed loosely around its canal? The one is not more injurious than the other, for the roll of linen is prejudicial in proportion to the degree

of over-action it excites. The only way in which I can comprehend how Scarpa has succeeded so often, is, by supposing that the roll of linen was chiefly applied to the insulated and dead part of the artery, between the ligatures. Had it been otherwise, it must have been more injurious than it seems to have been.

It has already been mentioned, that adhesion is a more delicate process in arteries, than in other parts. Dr. Jones' experiments show, that trivial causes derange and prevent its completion; and that no agent has a more powerful tendency to do this, than the excitation of ulceration in the vicinity of the newly obliterated artery. Yet so far from wishing to avoid this, we are told by Scarpa that our success is to be regulated by procuring it. Where the testimony of authors is so contradictory, who shall decide?

Dr. Jones appeals to carefully performed experiments, and Scarpa ranges in order his long train of arguments, and his comparative estimate of success. It is, however, to be remembered, that Scarpa's facts, observations, and conclusions, are all drawn from cases prior to the publication of Dr. Jones' work, which he does not appear to have seen. His success can, therefore, only be compared with that of the operations performed on the original Hunterian mode, which we have already seen was defective. When, consequently, we grant that the mode of operating introduced

by Scarpa, in so far as it wants the reserve ligature, and in so far as it preserves the wound open, till all extraneous substances are removed, is better than that of Hunter, still it is not to be put in comparison with the mode at present in use in this country.

Till the publication of Dr. Jones' work, surgeons, generally, had no very distinct notion of the manner in which the coats of arteries are supplied with nourishment. Few troubled themselves with such inquiries; and most, I believe, supposed that the vasa vasorum derived their blood from the main trunk of the artery itself. Dr. Jones corrected our ideas on this subject; for he clearly demonstrated, that the blood which circulates in the vasa vasorum is obtained from the neighbouring branches. Hence, if these be destroyed, although the large trunk be kept full of blood, the coats of the vessel must die from want of nourishment. Had Dr. Jones done nothing else than made generally known the mode by which the vessels are nourished, he would have performed a most valuable service to surgery. It was too often the practice, before his observations were made public, to detach a considerable part of the artery, and to apply the ligature round some part of the insulated portion of the vessel. His observations have shown the impropriety of this practice, which is now generally abandoned.

We now disturb the artery as little as possible, and we either tie one ligature of proper tightness round it, or we apply two ligatures, one as high up, and the other as low down as the vessel has been detached, and divide the artery in the space between them, as was done by Etius, and which has been, with great propriety, lately revived by Mr. Abernethy. Notwithstanding the general opinion, that the latter is the preferable mode, Dr. Jones has demonstrated, that when properly executed, the single ligature is as safe, and as certain as the double one. The more frequent failure of the single, than of the double ligature, is occasioned by the improper way in which it is applied. There are, in fact, direct experiments to prove, that the apparent superiority of the one over the other is not to be justly attributed to the intrinsic merit of the one being greater than that of the other. When two threads are employed, one is put as high, and the other as low as possible on the artery, which is thus, where tied, left adhering to its nutrient twigs; but when one ligature only is used, it is generally placed somewhere on the insulated part of the vessel. This, as has been already explained, is productive of secondary hæmorrhage.

The single thread produces a more copious effusion of lymph round the artery, on which one part of the security depends, than the double ligature, provided it be passed round the vessel

without detaching it from its adhesion to the parts in the vicinity, to a greater extent than is absolutely required to allow it to pass. Although this be really true, yet as it is much more difficult to perform the one operation properly, than the other; I have no wish to see the single ligature revived, even now that we are aware of the causes occasioning its failure, and can obviate them.

Let us, as recommended by Mr. Abernethy, employ two threads, small, round, and even, and let these be passed round the artery, which is to be as little disturbed, as is compatible with their passage, and then let one be tied pretty tightly at the highest point of the vessel, and the other at the lowest, then cut the artery through between them. Perhaps this may be all that is generally required to procure obliteration of the canal of the vessel but where the patient is of an irritable habit, it will be proper to lessen still farther the irritation, by removing one end of each ligature; and if accidentally any more of the artery should have been insulated, than was barely sufficient to permit of the application of the ligatures, I would also remove that portion intercepted between the threads. This, in the hands of a dexterous surgeon, will never be required; but unfortunately, all who undertake to operate, are not equally qualified; some detach a great part of the vessel, which, if

left in the wound, must prove as much a source of irritation as the reserve ligatures of the ancients, or the linen roll of Scarpa. The operation may succeed in either way; but unless there be some positive advantage to result from such procedure, it had better be avoided. As a greater than a just degree of irritation must prove injurious, we are, in every instance, to endeavour to procure adhesion of the wound by the first intention. This will add materially to the security of the operation. Where, however, from the irritation of the ligature, any purulent matter forms about the artery, we are immediately to enlarge the opening, to prevent the formation of sinuses round the vessel, which by detaching the artery from its connexions with the neighbouring parts, tends to produce secondary hæmorrhage.

So soon as the ligature is tied round the artery, the tumour becomes flaccid and ceases to pulsate, the vital actions of the limb are languid, it feels cold and weak, it is benumbed, and almost in a state of paralysis. It seldom, however, remains long in this condition, generally in a few hours it begins to revive, and in some time longer, its heat is even increased one or two degrees above that of the opposite limb, which is the surest sign of the success of our operation; it tells us forcibly, that the circulation is established in its new channel, and assures us, that we have nothing now to dread from the limb dying for want of nourishment. At

first when the circulation begins to be restored, there is a sensation of creeping in the parts below where the ligature is tied, or a feeling as if cold water had been poured over the limb. This, in a longer or shorter time, is succeeded by a strong vibratory action of the anastomosing arteries, which are conducting the circulation, but the heat of the member does not become steady for a week or two.

Soon after the operation, the tumour ceases to be painful, its remaining contents are absorbed, its thickened and diseased coats are taken away by the lymphatics, very gradually, however, yet before the end of the seventh week, if the tumour has not been very large, it is materially reduced in size, but for some months it can be distinguished as a small hard knob. In proportion to the decrease of the tumour the œdema lessens, and the limb improves in strength.

Some surgeons recommend after the operation, that stimulating embrocations, heated bricks, or bladders filled with hot water, be applied to the member during the time that it is cold, and languid in its circulation. This is a most pernicious practice; all that we are really called on to do, is by rolling the limb in flannel, and placing wool or cotton round it, to prevent it from losing its heat. If we stimulate the member, we destroy it. Who would ever think, of desiring a patient who has fatigued himself by a long walk, to recruit himself

by taking a longer one. Any man in his senses, would consider such an advice as highly absurd. Why then, in local debility, call on the limb to perform actions which must be fatal to it? Care must not only be taken, not to over-excite the limb, but we must even be watchful to keep the action of the system moderate. The propriety, and absolute necessity of this, will be best enforced on the mind, by pointing out the consequences which resulted from increased action of the system, in a person who had been operated on.

The patient was a middle aged man, in whom the aneurism could evidently be traced to have arisen from a sudden motion of the knee joint. The tumour was not larger than a turkey's egg, was perfectly circumscribed, not very painful, and was unaccompanied with œdema of the limb beneath. Under these favourable circumstances, the operation was performed, and the person for some days, did extremely well. The functions of the limb were restored, and the wound was nearly healed. Indeed, he continued to mend progressively, till the temperature of the member was fairly established, and till the enlarged anastomosing arteries could be felt pulsating, and the tumour had decreased to the size of a pigeon's egg.

About this time, from an accidental cause which need not be specified:* an extremely

* Mr. Burns from a feeling of delicacy towards the person who committed the blunder, does not specify the cause which produced the "irre-

irregular action of the system was brought on, attended with great prostration of strength, and accompanied with inconscious discharge of his urine and fæces. His stools were passed so frequently, that it was almost impossible to keep him clean and comfortable. In this state, he was seen by another surgeon and myself. From the frequency and feebleness of the pulse, the urgent diarrhœa, the rapid sinking, and the facies hippocratica, we judged it proper to prescribe a cordial mixture, and he was likewise directed to take a grain of solid opium, every four or five hours.

By these, the purging was checked in about ten hours, but the pulse continued frequent, and became fuller; the tongue remained foul, and the head was, at times, confused and painful. The limb which had been operated on, felt, since the induction of the debility, and previous to the use of the stimuli, cold, but he could move it freely; so soon, however, as the stimuli roused the system, he complained of its being insufferably hot. This increased heat of the limb, continued for about a a day and a half, when the toes and part of the foot became of a leaden colour. In a few hours,

gular action of the system," as I however, consider that without this knowledge the case is imperfect, I think it proper to state the fact. The patient's bowels having become torpid, he was ordered a purge, to contain some jalap and six grains of calomel. The individual whose duty it was to prepare the medicine, used in a mistake the tartar emetic instead of the calomel, which necessarily had the effect of violently exciting the whole system.—Ed.

the dark colour of the toes had increased, they were now deprived of sensation, and a few vesications appeared on the side of the foot. He was desired to apply cloths dipped in camphorated alcohol to the foot, and internally he took small quantities of wine, together with as much bark as the stomach would bear.

On the following day he felt better, his toes had regained, in a considerable degree, their feeling, and the vesications and discoloration on the foot had not extended. He continued to mend during other two days, when suddenly, and without any obvious cause, his foot became worse, his mind became clouded, his countenance anxious, his pulse sunk, and he lost all relish for his food, and was drenched in cold perspiration. At this period, he was incapable of speaking, his breathing was laborious, and accompanied with a rattling noise, his eyes were fixed and glazed, his jaw fallen, his limbs were cold, and a gangrenous slough had formed on the outer surface of the foot.

The camphorated spirit was continued to the foot, and as he rejected the wine, a tea spoonful of tincture of cinchona was given occasionally. By persisting in the use of this medicine, and by adding to it light, digestible, and nourishing diet, mixed with small quantities of wine, there was, in the short space of two days, a material improvement in his situation. It is mentioned in the notes I took of the case, "the pulse has risen in

strength, the eye has brightened, the countenance is now composed, and the mind is serene, he eats with considerable relish, and has recovered completely his speech. The foot has even put on a better appearance, the slough which continues superficial, has not spread, the rest of the foot and toes are less livid, and begin to recover their warmth and sensation; he has no pain in the limb, and in every respect feels easier."

By perseverance in the same plan, the slough separated, leaving along the edge of the foot a sore by no means as large as might have been expected, from the alarming appearance which the foot at one time presented. By dressing the sore for a few days with warm dressings, granulations began to form, but they were never healthy, nor did they ever make much progress. The general system had received an irreparable shock, from which it could never recover. After one or two weeks of protracted suffering, he died; yet before this event took place, both ligatures had come away, one on the fourteenth, and the other on the fifteenth day, and the wound had healed.

This is a curious and very interesting case. The circulation for several days seemed to be fully supported by the anastomosing vessels. When he was seized with general irregular action, from this cause, and the diarrhœa, he was reduced to the last stage of debility, the limb which had been

operated on, being still in a ticklish state, suffered more than the rest of the body. It felt very cold, but retained its colour and motion. It did not appear to suffer materially from the deficiency of blood; for, although more weakened than the other parts, still there appeared no tendency to gangrene. But when by the stimuli, which were prescribed with a view to support the system, the action of the whole body was increased, that of the limb was also augmented; but from the previous reduction of its vital power, it was incapable of bearing a similar increase of action as the other parts; soon, therefore, after the use of the cordial mixture and the opium, of which he only took two grains, it felt, to use the patient's own expression, "as hot as if on fire." It was at the time these medicines were administered, in a condition nearly similar to that of a limb benumbed with cold,—its vascular action was much depressed. When in this state, it was excited to a degree which overpowered its feeble energy, just as would have happened by suddenly heating a frost-bitten member.

In the Appendix to the translation of Professor Scarpa's work, by Mr. Wishart, a case will be found, which corroborates what has been stated, respecting the induction of gangrene by vascular excitement. The case to which I allude, is that of Francis Ballon. This case is introduced by Mr. Wishart, as illustrative of gangrene occur-

ring, because the anastomosing arteries did not enlarge to a proper degree, to carry on the circulation. From an attentive review of his case, it strikes me, that in it the gangrene was not occasioned by deficiency of circulation. The precursors of sphacelation were not such as would have taken place, had the mortification arisen from want of blood.

At the time the operation was performed, the system was by no means in a very favourable state. The symptoms were such as to lead one to suspect more mischief than what was apparent. M. Mursina says, "the general health of the patient was not very unfavourable, if we except a slight degree of fever, with quickness of pulse towards evening." Yet such a condition I would dread more than a regularly formed hectic. The latter, experience has shown, will generally disappear, when we remove the cause which kept it up; but the former renders the result of any operation hazardous. It is a deceitful and insidious affection, which without seeming to be connected with any peculiarity of condition, yet really accompanies a state of body which is most unfavourable for operation. The patients have an anxious countenance, a sharpness of feature, and an irritable quick pulse; symptoms, which still continue after the operation, and which, in a few days, are followed by a sudden alteration for the worse. Sometimes the patient is carried off by an irregular

fever, at other times he sinks under an obstinate diarrhœa, accompanied with pyrexia and delirium, or is worn out by incessant cough, restlessness, and want of appetite; or he falls a prey to local gangrene. I may add, that I have never seen any treatment arrest the progress of the disease.

The operation on Ballon, performed in the Hunterian mode, was followed by the usual effect—reduction of the temperature of the part below the ligature. Four hours had just elapsed, when the upper part of the leg became warm. On the third day, the limb, down to the ankle joint, "was warm; but the foot was cold, though not without feeling. The skin of the foot was shrivelled, and formed small folds." Soon he complained of a burning pain in the wound, and in a short time an equal and moderate heat diffused itself over all the limb, and was followed by a gentle moisture. The folds on the foot disappeared as the heat returned, and pressure on the veins of the leg produced turgessence of those below. These facts are so strong that they hardly require any comment. Do they not clearly demonstrate, that the circulation was now re-established to the very extreme points of the limb? Of consequence gangrene was not now to be apprehended from deficiency of blood; yet the member was far from being safe. On the night between the fourth and fifth day, he had severe pain in the limb, following the course of the vessels, and extending upward toward the abdomen;

"the pulse at the same time was small and quick, and the heat very great." By a very small dose of the tinct. opii, twice repeated, the symptoms were removed, "except a burning sensation which began in the knee, and extended to the sole of the foot." Till the eleventh day the patient mended; "all the toes except the little one were extended, and the skin covering them and the foot was of natural colour, and warm. But towards evening of this day, the back of the foot began to swell, and the colour of the skin became darker than before. *The temperature of the extremity was increased at this place, especially where the toes join the metatarsal bones.*" This fact of itself, were it even uncorroborated by the other concomitant circumstances, would be sufficient to establish the fact, that the gangrene, in this case, was not induced by want of blood. Can any one believe, that during eleven days, the limb would remain without circulation, and yet show no tendency to gangrene? In reality, if the cases in which sphacelus has taken place from deficient circulation, be reviewed, it will be found that the parts have never recovered their natural heat; and it will also be observed, that the mortification has commenced very shortly after the operation. Some may say that instances are on record, in which mortification has taken place from want of blood, and yet where the parts have regained their

warmth after the operation. But this, in so far as I can learn, has only happened in those cases where heated applications have been had recourse to. And I think I may even go the length of saying, that in these cases, so soon as the substance imparting the heat has been removed, the heat itself has begun to be dissipated, and has soon been altogether lost. I need hardly add, that where the limb receives this usage, although it might, perhaps, have otherwise escaped, it will be irretrievably destroyed. In the case of Ballon it must have been observed, that the heat was restored by operations dependent on the vital actions of the parts, and the limb survived till it was beyond the risk of gangrene, from deficient circulation:—His case might serve for that of the last patient, for the result was similar.

Notwithstanding the use of spirituous embrocations, and watery decoctions of reputed antiseptic herbs to the limb, and the internal use of aromatic infusion of bark, laudanum, and ether, the gangrene spread to the tarsus; but, as in the case which occurred to myself, the slough continued superficial, was confined to the back of the foot, and began even to separate. There was in neither case, from the extent of the local affection, any reason to expect a fatal issue, yet, in both, the constitutional symptoms ran so high as to render ultimate recovery altogether

out of the question. He died about a month after the operation; and it is worthy of remark, that from the first to the last the toes remained free from gangrene, which instead of beginning at the extreme points, as it would have done, had it been dependent on impaired circulation, commenced on the back of the foot, and proceeded upward.

These, and many other cases on record, warrant, I think, the conclusion, that after the operation for aneurism, we have fully as much to dread from over-excitement, as from want of blood. They also incontrovertibly prove, that this danger is not at an end so soon as the circulation is fully established in its new channel. The limb for two or three weeks continues in a precarious state. The immediate risk after the operation, is from want of blood; an event which will chiefly happen in old and debilitated patients; such as no intelligent surgeon would operate on. After this source of danger is over, there is still another and even greater to be apprehended from excitement, more than the limb in its weakened state is able to bear. In the latter case, the plan of treatment embraces only a choice of difficulties; what the most judicious treatment may be, remains to be determined by future experience.

Mr. Charles Bell, in his System of Operative Surgery, describes another species of gangrene

consequent to the operation for aneurism. As I have never, however, seen a case of this kind, I shall transcribe what Mr. B. has written on this subject. When treating of gangrene, after the operation for popliteal aneurism, he says, "I do not think that the cure of it is generally understood; at least, in the only two instances which I have seen, the cause was one which I do not recollect to have seen mentioned, viz. the inflammation and distension consequent upon the suppuration of the tumour behind the knee. Where the tumour has been small, and the œdema slight, I have no fear for the re-establishment of the circulation of the limb; but when the circulation seems perfectly established a few days after the operation, and there comes great distension about the knee, and the tumour in the ham becomes large and firm, when the œdema in the leg and foot does not go down, and there is pricking pain shooting to the toes, with a dark colour of the skin, I conceive there is danger of the vesications which precede gangrene, arising on the toes. This gangrene I have seen proceed in its course uniformly for several days, and cease upon the bursting of the tumour and the discharge of the blood of the aneurism, and a great quantity of offensive matter from behind the joint, and from under the bellies of the gastrocnemii. The tension, as I conceive, occasioned by the inflammation and the swelling

of the sac, had stifled and suppressed the free action of the collateral vessels, and the return of blood by the veins, so as to produce gangrene in the extreme parts. Should such a case present itself to me, I should have no hesitation in puncturing the tumour of the aneurism. To puncture it in this stage, after inflammation had taken place in the sac, I should imagine, would be attended with no hæmorrhage, but only with the evacuation of such grumous blood as flows with the matter when it bursts spontaneously. At all events, it should be so punctured that the opening might be closed again, in such a way as to avoid accelerating the wide extending suppuration which sometimes follows the dissolution of the blood in the sac.

"When gangrene has taken place, from whatever cause, and here as in others, the system must be supported. The countenance and pulse will sufficiently indicate the necessity of this. When the danger is warded off, the extensive suppuration, and the destruction of the bones, both from the matter and from their lying pressed to the bed by the weight of the limb will endanger the patient's life. In this state, we must still guard the general health, and wait for an opportunity of amputating."

Some have conjectured, that where the aneurismal tumour is so situated, that a ligature cannot with propriety be applied around the

artery, nearer to the heart than the tumour, that advantage will arise from passing one on the distal side of the sac. This is not a new opinion, nor does it now remain as a matter of conjecture. It has actually been put in practice, and has failed. I cannot conceive a more futile idea, than to suppose that such an operation could possibly tend to prevent the growth of the sac. One might readily believe, that it may, by preventing the blood from passing freely through the tumour, cause it to enlarge more rapidly than before. That it would occasion a firm coagulation of the contents of the aneurism, and a consequent enlargement of the anastomosing branches, and diversion of the blood from the tumour, is what one would hardly expect; and least of all, would any one imagine that Desault would have been the projector of such a doctrine, and Deschamps the first to put it to the test of experiment. In doing this, the latter had no reason to boast of his dexterity, nor could he say more of his success. Others who have ventured to follow his example, have not obtained a more fortunate result. Indeed, all circumstances considered, there is no point in the treatment of aneurism, which ought to be more decidedly reprobated than this: it is absurd in theory, and experience proves that it is ruinous in execution.

Having now attended to the cure of aneurism by a surgical operation, and having also pointed out the general causes of failure, arising from the direct consequences of the operation, I may next mention, that the patient is sometimes cut off by the sudden rupture of an internal aneurismal tumour. This would render it a most desirable object with the surgeon, to be able to discover whether an external aneurism was, or was not complicated with an internal one; but the truth is, we find great difficulty in detecting the existence of the latter, which, when present, will materially influence the success of the operation. Are we, therefore, on this account, in every case, to decline an operation, or how are we to proceed? I think the only answer which can be given to this, is to state the results of the operation in a certain number of cases, and to reason from the facts we obtain. This, Mr. A. Cooper of London, had the goodness to communicate to me, for insertion in an Essay on Aneurism of the Thoracic Aorta. This list contains the operations he has performed for the cure of external aneurisms. Their results, whether successful or the reverse, have been impartially stated, and the causes of failure mentioned. This detail cannot, therefore, fail to be read with great interest. It is intended to show, that although internal aneurism, may, in some patients, be conjoined with external, that still this combination is by no

means so frequent as to afford any reasonable objection to the performance of an operation for the removal of the latter. The fact is, that unless where an operation is obviously prohibited by the unequivocal existence of an internal aneurism, or by that febrile state which renders abortive any operation, we are, if the patient be otherwise in a favourable condition, to attempt the cure of every external aneurism, by operation. If the operation prove sometimes unsuccessful, from the rupture of an undiscovered internal aneurism, this circumstance cannot surely be brought forward as an objection to the operation, or be laid to the charge of the operator. It argues no neglect or deficiency on his part; for it may happen in the practice of the most intelligent, as readily as in that of the most ignorant. It is an event which the most consummate knowledge can generally neither foresee nor prevent.

Although it would evidently be improper to hazard an operation in a patient, in whom there existed symptoms characteristic of an internal aneurism, yet I can confidently advise, that where other circumstances are favourable to the attempt, we should endeavour, even where we have reason to believe that the aorta is aneurismal, to cure the external disease by compression. This advice is only, however, applicable to aneurisms seated about the extremities. At present, I know a gentleman, who during some months watched a

pulsating tumour in his ham, which was slowly increasing in size, and imperceptibly impairing the motions of the limb. The characters of aneurism were so decidedly marked, that there could be no hesitation as to the nature of the disease. But an operation was thought by some to be out of the question, from the probability of the patient's having some affection of the heart. He complained of a difficulty in breathing when he exerted himself, and he was liable at times to fits of palpitation of the heart, and unpleasant sensations about the chest. He was of a full habit of body, and had an unhealthy look. Taking these circumstances into consideration, he was advised not to submit to an operation. He was directed to live sparingly, to keep the circulation moderate, and the bowels very easy, and to avoid exertion. The limb was rolled in a moderately tight bandage, from the toes up along the thigh, the pressure being increased at the knee joint, by a compress applied over the tumour.

By persisting in this treatment for a few weeks, the tumour, which had never been larger than a hen's egg, became pretty solid. Ultimately it became perfectly firm, and ceased to pulsate. During the progress of this case, the leg continued to receive a due supply of blood, and a new course was established for the circulation. An artery about the size of the radial could now be traced along the tendon of the semi-mem-

branosus muscle, between it and the firm tumour. A little above, and a little below the knee joint, this artery ceased to be distinguishable. Its origin and termination was obscured by the thickness of the part which cover them, but no one could mistake its office.

There can be no doubt that the coagulation of the contents of the sac was accelerated by the bandaging; and there is almost a certainty that this patient will never experience any farther inconvenience from this tumour, which has, in fact, no connexion with the circulation, which is performed altogether independently of the popliteal artery. But still the risk is imminent, the affection of the chest is not removed, neither is its nature ascertained. It may be merely sympathetic, but it is to be feared that it has a more serious foundation. It too nearly resembles aortic aneurism, not to afford just cause for apprehension.* His fate may, perhaps, be similar to that of MacDonald, operated on by Mr. Freer of Birmingham. By this gentleman he was cured of an inguinal aneurism on the right side. Soon afterwards he perceived an aneurismal tumour in his left ham. This was also removed by an operation performed by Mr. Anderson, in the Glasgow Infirmary. To appearance the patient recovered most completely. Contrary, however, to instructions given him on quit-

* This gentleman died about two years afterwards, from the rupture of an aortic aneurism.—Ed.

ting the hospital, he engaged in the active duties of a game-keeper,—continued to improve in health and strength; but suddenly died, while leaping a hedge or ditch, from the bursting of an abdominal aortic aneurism.

The carotid artery seems to be most prone to disease at the point where it bifurcates; here its "*tissu arteriel*" becomes frequently cartilaginous, or earthy matter is deposited in its structure. This weakens the artery, and paves the way for rupture of the internal coat and "*tissu arteriel*," followed by dilatation of the membranous coat and external covering. It lays the foundation of aneurism, which is generally seated at the bifurcation of the carotid. I have repeatedly, in the dead subject, met with a dilatation of the common carotid and root of the internal carotid, forming a cyst nearly as large as a filbert nut, and I have twice felt a similar state of the vessel in the living body. In some of the former cases, the texture of the artery was altered, but in most of them the dilatation had taken place, independently of any organic disease of the coats. In the two instances in which the artery was enlarged in the living subject, the patients experienced no inconvenience, nor for some months, during which I had an opportunity of seeing them, did the dilatation seem to advance.

Till lately, aneurism of the carotid artery was a most hopeless disease. Its cure is a recent invention, which is calculated to impress us with the

great and decided superiority of modern over ancient surgery. The experiments of Dr. Thompson and of Dr. Jones had, indeed, paved the way to improvement in the treatment of this species of aneurism. Their observations clearly proved the safety of including the carotid artery in a ligature. They intercepted the circulation of the blood along this vessel, yet neither the brain nor any other part of importance suffered; the ligature separated as readily and as easily as from any other artery of similar size. The dread of the thread being detached by the strong action of the vessel, and the vigorous impulse of the blood against it from the heart, was shown to be without foundation. The safety and practicability of tying this vessel was established on the sure basis of actual experiment. It was demonstrated that the brain would be fully nourished by the vertebral arteries, assisted by one carotid, a fact which had, indeed, before that time, been ascertained on the living human subject.

All were ready to admit these truths, but none had the resolution to act on them in aneurism of this vessel. When surgeons were thus divided between hope and fear, an accident occurred, by which the carotid artery was wounded. Mr. Abernethy saw the patient, and although the circumstances were by no means favourable, still, as affording a chance of recovery, he tied the vessel. Shortly afterwards the man died, from the exten-

sion of inflammation to the membranes of the brain. This was an unfavourable case, and the result of the experiment was rather against its repetition.

When, therefore, Mr. John Bell saw a case of aneurism of the carotid artery, he watched its progress, from its slight beginning to its ultimate and dreadful issue: He reasoned about the propriety of operation, and decided on its expediency, yet allowed the period for operation to pass by, without having made any bold attempt to save the life of the patient. He left her to die, when worn out by a painful disease, protracted during the space of six weeks.

Mr. Astley Cooper next balanced in his own mind the advantages and the risk of an operation. From a careful review of the facts on record regarding ligature of the carotid artery and other large vessels, he satisfied himself that although the danger of operation was great, it was still by no means equal to the certain fatality of the disease, if left to run its course. He resolved, if he should ever be called to a case of this kind, that he would, if other circumstances were favourable, without delay perform an operation; for hazardous as he knew it must be, he was convinced that it was the only remaining hope of the patient. A case soon occurred. He carried into execution his proposed plan,—the patient died. Yet he was not discouraged; he persisted in his purpose, and in the end had the pleasure of witnessing

his efforts crowned with success. He established on indubitable grounds, the propriety of having recourse to an operation. A review of the cases in which an operation has been performed, will convince every one that the causes of failure were not such as to affect the merits of the operation. These cases are to be found described in the Medico Chirurgical Transactions,* in an inaugural dissertation on carotid aneurism by Dr. Vose,† and in the London Medical Review.‡

In no operation, is a correct knowledge of the locality of the parts concerned more indispensably necessary, that in the case under consideration. If the situation of the carotid artery, in the different divisions of the neck, be remembered, it will be evident that the difficulty in exposing and securing that vessel will be greater or less, according to the part we select. Above the point of decussation of the omo-hyoideus and the sterno-mastoid muscles, the artery is easily reached. Unfortunately, however, it happens, that in an aneurism of the carotid artery, especially if the disease be in any degree advanced, the sac descends so low in the neck that we are obliged to take up the artery nearer to the clavicle than this point. Here the vessel is with more difficulty got at, it lies deeper, and it is now more closely

* Medic. Chirurgical Transactions, vol. 1st.

†Disputatio Pathologica de Arteriæ Carotidis Aneurismate. Jacobus Vose, Edin. 1809.

‡ London Medical Review, No. 5, p. 96.

connected with other important parts. Instead of having only to divide the skin, platysma myoides, and fascia, we have to dissect back the sternal head of the sterno-mastoid muscle, which, by its inclination forward, covers the carotid artery at the lower part of the neck. Nor is this the only muscle we require to displace, the sterno-thyroideus must also, in some measure, be drawn in front of the trachea, before the sheath of the artery is brought into view.

When these muscles have been turned aside, the sheath which contains the jugular vein, the carotid artery, and the nervus vagus, must be cautiously opened. This is, sometimes, not to be accomplished without considerable difficulty. When this is executed, the next point is to separate, along a small space, the artery from the parts in the vicinity. The size and density of the nervus vagus render the separation of it from the artery safe, but the detachment of the jugular vein is not equally easily accomplished. During inspiration it falls collapsed, but during expiration it swells out full and tense, covering almost completely the front of the artery. The transitions from emptiness to fullness are so rapid, that sufficient time is not allowed to detach it from the carotid. The operator, therefore, feels a considerable difficulty in this part of the operation; prudence and dexterity are both required to enable him to finish it.*

* See Appendix, (C.)

Although this difficulty be perplexing, yet there is another species of danger, which, because less apparent, has been less insisted on.

The jugular vein is evident from its size, and from the colour of its contents; injury of it may, therefore, be generally avoided. Besides, its office, is not so important but that it may be dispensed with. We would, notwithstanding, carefully avoid injury of this vein, but if we did happen to hurt it, experience teaches us, that the event would not influence the success of the operation. The firmness of the nervus vagus is its protection, while the close connexion of the sympathetic nerve with the spine guards it from injury. When, however, the operation is performed low in the neck on the left side, the termination of the thoracic duct is not so secure. It lies just behind the carotid, interposed between its sheath and the sympathetic nerve, and in some subjects, it mounts pretty high in the neck, before it curves downward and outward, to join the subclavian vein. We would most carefully avoid injury of this vessel, yet its position exposes it to be hurt.

The nerves, if cut, will reunite, and the vein, if injured, will transfer its circulation to some of the collateral branches; but the thoracic duct is a vessel for which there is no substitute.* Its

* The lacteals generally anastomose with the lymphatics of the liver and diaphragm, so that even where the thoracic duct has been obstructed, the chyle has continued to find its way into the blood; but this is no argument against the general assertion, that the thoracic duct is a vessel for which there is no substitute.

function cannot he dispensed with; it must be avoided, yet its proximity to the artery is such, that a rash operator may tear it asunder, while detaching the carotid from its connexions. It is of small size; its coats are thin and transparent; and it is only after a good meal, that its canal is filled with a white fluid. The surgeon has, therefore, no monitor, except his previously acquired knowledge, regarding the locality of the duct, which will teach him to keep as much in contact with the coats of the vessel on the back part, as possible. A precaution equally required, to prevent injury of the sympathetic nerve, and nervous superficialis cordis, as of the thoracic duct.

It is also necessary to remember, that there may be two arteries low in the neck. In a female child, I lately found the left vertebral artery rising from the arch of the aorta. On the right side of the same subject, the vertebral artery originated from the subclavian, along side of the carotid artery, behind which it suddenly insinuated itself. It afterwards ascended along the surface of the rectus major anticus, attached to the sympathetic nerve, till it reached the third cervical vertebra. At this part of the neck, just a few lines below the bifurcation of the carotid, the vertebral artery entered the vertebral canal. The artery lay exterior to the sheath of the cervical vessels and nerves; but in its whole course

ran parallel to, and immediately behind the common carotid artery. It was nearly as large as the barrel of a goose quill.

I consider this to be an important variety in the distribution of the cervical vessels. It is one, which the surgeon ought never to loose sight of, while operating about the neck. In taking up the carotid artery, it might have embarrassed him, for it was only separated from the carotid, by the thin interposed sheath. We have full proof that the carotid artery may be tied, without impairing the functions of the brain; but we have no testimony that this organ will continue to discharge its actions, if the carotid and vertebral arteries on one side be both included in a ligature. In passing the thread, therefore, round the carotid, care ought to be taken, not to carry it behind the sheath, because, while the ligature is kept between the artery and the sheath, neither the end of the thoracic duct, nor the sympathetic nerve, nor the superficial nerve of the heart, nor the vertebral artery, can possibly be included.

There is also another object in remembering this anomally of the vertebral artery. Had this vessel become aneurismal, the tumour produced, would, in almost every point, and in every essential character, have resembled carotid aneurism. The surgeon, deceived into a belief, that the disease was seated in that vessel might have

taken it up; but his astonishment would have been great, when he discovered that tightening the ligature made no impression on the sac; that it still continued to pulsate with equal vigour as before, and was in no degree diminished in size. When, therefore, the surgeon has reached the sheath of the vessels, he ought, uniformly, before opening it, to press the carotid between the finger and thumb. If the pulsation of the tumour be not in this way affected, he will do well to pause before he pass a ligature around that vessel. A new operation would be required, to interrupt the circulation along the vertebral artery.

Although this be altogether supposititious, still the occurrence is within the range of probability; what the result would be, no man can predict. Let not, therefore, any operator forget that he may meet with a similar arrangement of the vessels, while operating on the living subject; neither let it escape his recollection, that unless the nature of the complaint be carefully ascertained, he will probably require to intercept the course of the blood, along two of the large arteries belonging to the brain.

In aneurism of the carotid artery, it is likewise proper to remember, that the common carotid artery sometimes divides into its external and internal trunks, very low in the neck, even opposite to the sixth vertical vertebra. Now it is demonstrable, that were one of these vessels

becoming aneurismal, there would be no necessity, and therefore no propriety, in taking up both; neither would it be necessary or proper to tie the common trunk, unless where the disease was seated so low as to require it. I cannot point out any character by which it may be ascertained, before beginning the operation, that there are two arteries in the neck; but I think that a surgeon who is aware of the possibility of such an occurrence, may discover it by pressing the vessel between the finger and thumb before tying it.

In regard to the general treatment, previous to, and after the operation, much will not require to be said. Where the patient is young and plethoric, with the constitution unbroken, it will be prudent to reduce the strength before operating, by occasional bleeding, conjoined with purging and spare diet. After operating, the surgeon is to enjoin the strictest rest, is to avoid carefully whatever has a tendency to accelerate the circulation, and is only to allow the lightest and most digestible food. In fact, the most rigid antiphlogistic regimen is to be followed out, and whenever, notwithstanding this, we perceive any tendency to increased action, purgatives are to be employed. Invariably the bowels are to be kept easy, and rather open, which may be done by proper attention to diet and the frequent use of stewed fruits, or by

employing a solution of the super-tartrite of potass for common drink.

Where an anodyne has been required after an operation for aneurism, I have preferred hyoscyamus, provided it did not disagree with the stomach.

I have very little to say concerning the mode of performing the operation of tying the carotid artery. The patient, seated on a chair, is to recline his head on the breast of an assistant, standing behind him. Then the surgeon begins as far below the tumour, as shall leave a space of two inches at least, in which to cut between the commencement of his incision and the clavicle. At the first stroke of the scalpel, he is to cut through the skin and platysma myoides, then he is to divide the fascia along the course of the anterior margin of the sterno-mastoid muscle. When this muscle is exposed, he is to dissect beneath it, turning it outward till he reach the outer margin of the sterno-thyroid muscle. He is then to raise that muscle, in doing which, he will divide the filaments of the descendens noni which pass into it. By a blunt hook, the sterno-mastoid muscle is to be pulled aside along with the omo-hyoideus, toward the acromion, while, by a similar instrument, the sterno-hyoid and thyroid muscles are to be drawn over the trachea. By this displacement of the muscles, the common sheath of the carotid artery, internal jugular vein, and nervus vagus will be

exposed. On the tracheal side of the sheath, if the operation be performed on the left side, the œsophagus will be brought into view, covered by the filaments of the recurrent nerve; on either side, the nervus descendens noni will be seen lying on the fore part of the sheath. A finger is now to be employed to press aside the jugular vein, after which, the sheath is to be scratched through exactly over the carotid artery, till a director can be introduced between them. Along the director, the sheath is to be opened, avoiding in doing this, injury of the trunk of the nervus descendens noni.

When the sheath is opened to the extent of about three-fourths of an inch, the handle of a scalpel is to be insinuated between the artery and the jugular vein, retaining it as closely as possible in contact with the former. By pressing it gently, but steadily forward, and by moving it slightly upward and downward, while the vein is flaccid, and desisting while it is tense, the artery will soon be detached from its connexion with the neighbouring parts on that side. By similar means it is to be separated from its adhesions on the tracheal side. In accomplishing this, neither violence in thrusting forward the handle of the scalpel, nor rudeness in pulling outward the artery from its sheath, are to be permitted. The former may injure the thoracic duct, the latter, to a certainty, will destroy the vascular adhesions of the artery above and below the part where the threads are

to be tied, and will thus lay the foundation of inflammation, suppuration, and secondary hæmorrhage.

When about half an inch of the artery is completely insulated, the handle of the scalpel is to be withdrawn, and an aneurismal blunt needle, armed with a small, firm, and round, double ligature, is to be passed beneath the vessel, care being at the same time taken, not to include any of the nerves.* The ligatures are next to be separated, and one of the threads is immediately to be tied as low down as the artery has been detached from its connexions, and the other is to be tightened as high up. There will thus, where the operation has been properly performed, be about half an inch of the vessel intercepted between the ligatures. If more of the artery be intercepted, I would, for reasons stated in the general observations on aneurism, be inclined to remove a part of it. This is not, however, material, where a small portion has been intercepted between the threads, especially, since it has been proved by Mr. A. Cooper, that it is perfectly safe to leave the vessel without dividing it in the interspace.

So soon as the ligatures are tied, and one end of each removed, the lips of the wound are to be

* In passing the ligatures, a needle made of unalloyed silver is to be employed. Its flexibility is greater than when mixed with any other metal. Now, the chief difficulty in conveying the thread round the vessel, arises from the needle not bending easily; but by using a needle of pure silver, this is considerably obviated. Mr Abernethy has recommended its use.

brought into contact, and retained so by strips of adhesive plaster. The neck is then to be lightly dressed, and the patient removed to bed. There, to avoid putting the artery on the stretch, when it has not been divided between the ligatures, which ought generally to be done, it will be advisable for him to lie with his head raised, and his chin inclined to his breast.

The preceding remarks on the mode of operating, have been delivered from the experience obtained from trials made on the dead subject, and from the description of the operations which have been performed on the living body. As I have never myself had an opportunity of performing, or of seeing this operation performed, except on an inferior animal, I shall offer no apology for transcribing one of Mr. Astley Cooper's cases. It will illustrate the nature of the disease, the way in which the operation was performed, and the after-treatment.

"Humphrey Humphreys, aged fifty, who has been employed to carry loads of iron* as a porter, observed six or seven months ago, a tumour, having a pulsatory motion, and about the size of a walnut, on the left side of the neck, just under the angle of the jaw, and extending from thence downwards to the thyroid cartilage. It was accompanied with great pain on the left side of the head,

* "The employment consists in this:—A collar of wood is placed around the neck and upon the shoulders, and he carries bars of iron on each shoulder thus protected."

which began about five months ago, and was attended with a sense of pulsatory motion in the brain. The tumour affected his speech, so as to make him extremely hoarse; and he had more recently a cough, attended with slight difficulty of breathing, and which seemed to be the effect of the pressure on the swelling of the larynx. His appetite was sometimes affected by it; for three or four days he eat heartily, and then for many lost his relish for food. He had a sense of coldness, succeeded by heat in his left ear, and he often became sick when eating, but did not vomit. Upon attempting to stoop at any time, from that period he had an insupportable feeling, as if his head would burst; a giddiness, loss of sight, and almost total insensibility.

"The left eye, which had for some time been gradually closing, appeared now not half as large as the right; yet its power of vision was equally perfect.

"A blister was at this time ordered to be applied on the head by Dr. Hamilton, which lessened his pain. A month ago he applied another with the same relief, but it lasted only for a few days. He continued to work until the day previous to the operation.

"The dilatation of the carotid artery was seated just below the angle of the jaw, and about the acute angle, which is made by the great division of the common carotid. The tumour was about

the size of a pullet's egg, and prominent in its middle.

"The pulsation of the aneurism on the day of the operation was remarkably strong. When the sac was emptied by pressure on the artery below, the tumour sprang to its original size with one contraction of the heart.

"I proposed to tie the common carotid below the dilated part, and the operation was performed at one o'clock, on the twenty-second of June, 1808, at Guy's Hospital.

"I began my incision opposite the middle of the thyroid cartilage from the base of the tumour, and extended it to within an inch of the clavicle on the inner side of the sterno-mastoid muscle. On raising the margin of this muscle, the omo-hyoideus could be distinctly seen, crossing the sheath of the vessels, and the nervus descendens noni was also exposed. I next separated the mastoid from the omo-hyoideus muscle, and the jugular vein became apparent, which, being distended at every expiration, spread itself over the artery. Drawing aside the vein, the par vagum was evident, lying between it and the carotid artery, but a little to its outer side. This nerve was easily avoided.

"A blunt iron probe, constructed for the purpose, was then passed under the artery, carrying a double ligature with it. Two ligatures being thus conveyed under the artery, the lower was

immediately tied. I next detached the artery from the surrounding parts, to the extent of an inch above the lower ligature, and then tied the upper. Lastly, a needle and thread were passed through the artery, above one ligature, and below the other. The division of the artery was then performed.

"Nothing now remained but to dress the patient, and this was done by drawing the parts together by adhesive straps, the ligature hanging from each end of the wound, and by laying on a piece of lint retained by straps of adhesive plaster.

"Mr. Vose, my dresser, whose attention to the case was unremitted, and to whose care and knowledge many of my patients have been indebted for their recovery, now asked the patient if he experienced any unusual sensations about the head. He answered, that for the first time, since two months after the formation of the tumour, he was relieved from a distressing pain, which extended up the left temple, accompanied by a violent throbbing of all the arteries of that side.

"The pulsation in the tumour had not, however, entirely ceased, although it was so much diminished as to become obscure; but it was felt by my colleague, Mr. Forster, by Mr. George Young, Mr. Dubois, jun. from Paris, who accompanied Mr. Young, by Dr. de Sousa;

and many others who were present at the operation. I concluded it to be the effect of the return of blood by the internal carotid artery, from the brain, in consequence of the free anastomosis which exists between the blood vessels within the skull.

"The patient was put to bed with his head elevated, and in this condition he felt quite comfortable.

"Three, *p. m.* Pulse was moderate, skin cool, suffered very little pain. Pulsation in the tumour perceptible, but inconsiderable, when contrasted with its force before the vessel was tied.

"Five, *p. m.* Pulse stronger and fuller, but in other respects as before; head entirely free from pain.

"Eight, *p. m.* Patient's pulse reduced to the healthy standard, skin cool; says he feels no pain.

"June 23d.—Six, *a. m.* Patient passed a good night.

"One, *p. m.* I saw the patient, he had a slight cough; has had no evacuation since the operation; pulse was not quicker than natural.

"Ten, *p. m.* The patient got out of bed and went to the water closet, and had an evacuation.

"June 24th.—Six, *a. m.* Pulse natural; pulsation in the tumour continues; tumour sore when compressed; has become firm, for the blood which was fluid in it prior to operation, and all yester-

day, is now coagulated; pain and a sense of fulness felt on the right side of the head.

"June 25th.—Six, *a. m.* Patient says he no longer feels pain in any part; has had a good night; has only one troublesome symptom, viz. an occasional rattling in the larynx, from accumulated mucus; pulse this morning quite temperate.

"Three. *p. m.* The tumour is considerably diminished; pulse moderate; no constitutional irritation.

"June 26th.—Eight, *a. m.* Patient had a good night; pulse still moderate; skin cool.

Eleven, *p. m.* Still free from any disagreeable symptom.

"June 27th.—Seven, *a. m.* Patient very restless during the night; coughed much, and had pain in the head; spirits depressed; pulse natural.

"Half-past one, *p. m.* Pulse eighty-four; feels much better than in the morning; has had an evacuation from the bowels since last night.

"June 28th.—Seven, *a. m.* Pulse natural; had a tolerable night; bowels open; no pain.

One, *p. m.* I saw the patient; pulse eighty-four; slight pulsation still to be felt in the tumour, which is much diminished.

"June 29th.—Pulse natural, no pain; pulsation still perceptible; tumour so much less that the skin is wrinkled over it.

"June 30th.—Wound dressed the first time;

and has united by the first intention, as far as the ligatures would permit; he is free from irritation.

"July 1st.—Pulse natural; man tranquil; pulsation very obscure; tumour firm; he is very hoarse.

"July 2d.—No stool; ordered opening medicine; very hoarse, so as to speak only in a loud whisper.

"July 3d.—Pulsation doubtful; man healthy.

"July 4th.—Going on well.

"July 5th.—Wound looks well; man appears natural; but the hoarseness continues.

"July 6th.—He is free from any symptoms of irritation.

"July 8th.—Patient says the tumour is now only half its size at the time of the operation.

"July 9th.—Ordered a poultice.

"July 12th.—Ligature projecting more; and much more discharge from the wound.

"July 14th.—Upper ligature came away, being removed by Mr. Vose.

"July 15th.—Lower ligature came away, pulsation very obscure.

"July 17th.—Man walked out of his ward; the tumour at this period was reduced to less than half its size. The pulsation in it was with difficulty perceived; but it continued until the beginning of September; at which period all who saw him agreed that the pulsation had ceased, and the tumour was then scarcely apparent. The

fascial and temporal arteries on the left side cannot be felt.

"The wound was a long time in healing: first, from a sinus in the course of the ligatures, and afterward from a fungus where the sinus had been placed.

"The man was discharged sound on the 14th day of September, and returned to the occupation of a porter, at Crawshay's Iron Wharf, Thames-street.

"Near eight months have now elapsed since the operation was performed, and he has returned to his former employment, without any diminution of his mental or corporeal powers, except the lessened action of the temporal and facial arteries on the side on which he was operated. The tumour has disappeared, and he has not been since subject to that pain in the head, by which he had been so much distressed prior to the operation."*

I have now attended to the relation of the different parts at the side of the neck, from the clavicle up to the lower border of the digrastic muscle; but I have still to consider the situation

* Medico Chirurgical Transactions, vol. 1. page 224, et seq.

and connexions of the thyroid gland. At present, I am only to inquire into the structure, connexions, and relations of this organ in the adult, in so far as these tend to illustrate the diseases of this gland, or to explain their effects. When I afterwards come to treat of the conformation of the neck, in the young subject, I shall have occasion to notice some other points concerning the locality of the thyroid gland in the early part of life, and likewise, to deduce from the facts to be then stated, some practical conclusions regarding the performance of the operation of bronchotomy.

The thyroid gland is a firm reddish-looking substance, bearing a considerable resemblance in its outward appearance, to the conglobate glands in the early period of life, which, together with its containing a number of lymphatics, has led some to conjecture, that it belonged to that system. Internally, numerous ramifications of arteries, veins, and absorbents, are traced branching over small cells, filled, in the child, with a turbid fluid of a slightly red tinge, but in the decline of life, containing a dusky yellow fluid. These cells do not appear to communicate freely with each other, since, by making a section of the gland, we only empty those cells which have been divided.

In the human subject, the thyroid gland is generally divided into two lobes, which are joined to

each other by a slip, which crosses the trachea a few lines below the cricoid cartilage. In one instance, I saw this slip placed between the trachea and œsophagus; a peculiarity of conformation at all times to be much dreaded. Were this slip, so situated, to become thickened and diseased, a terrible dysphagia and dyspnœa would be induced; affections which would neither admit of alleviation, nor removal by art.

The thyroid gland lies a little below the cricoid cartilage, its upper margin being generally parallel to the second ring of the trachea. It is covered anteriorly, by the sterno-hyoideii muscles, yet not completely, for between these, a small part of the central slip is exposed. Laterally, the sterno-thyroideii, and omo-hyoideii muscles, lie over the gland, but do not cover its whole surface. The upper peak of the lateral lobe, where it embraces the side of the cricoid cartilage, peeps from under these muscles.

The relations of the different parts of the gland to the trachea and œsophagus, must also be studied, otherwise the consequences resulting from disease of these parts, cannot be satisfactorily explained. These relations, however, will be best explained, when considering the diseases of the thyroid gland.

From the liberal supply of blood which the thyroid gland receives, it is liable to inflammation, which sometimes proceeds to suppuration. This

state may be either general or partial. The abscess, from the effect of the muscles and fascia, is flattened on its surface, it feels tense, and it is, from its mechanical influence on the subjacent parts, productive of considerable uneasiness. The inconvenience, however, is greater or less, according to the part of the gland which is affected. We shall find, that swelling of the right lobe is less injurious, than enlargement of either the cross slip or the left lobe. Where the disease is seated in the cross slip, as it lies directly over the trachea, difficulty in breathing forms the most prominent feature. Where the left lobe is enlarged, the inability to swallow is most complained of, but the patient at the same time, experiences difficulty in breathing.

Although the position of the part of the gland which is affected, has considerable influence in modifying the effects produced, yet I would not wish to be here understood, as representing that it alone is to be taken into account. On the contrary, we must also view the condition of the muscles, and other parts covering the tumour. The former determines the nature of the symptoms, the latter regulates their severity. In some diseases, the fascia and muscles yield before the swelling. In others they resist its increase. In chronic affections, the former takes place; in acute the latter. In bronchocele, dropsy, and scrophulous enlargement, the difficulty in breathing and swallowing, is

less urgent than in inflammation or schirrus. A tumour, therefore, of the latter species, even of small size, occasions a great degree of dysphagia or dyspnœa. We search for an explanation of the difficulty in breathing being greater than the difficulty in swallowing, in individual patients, and we find it accounted for, by the position of the part of the gland affected, but we know that all the parts of the gland are occasionally swelled, where neither the breathing nor swallowing are materially impaired. This depends on the condition of the fascia and muscles.

When suppuration takes place in the thyroid gland, the abscess, from the nature of its coverings, is long before it bursts. In some instances, before the integuments have given way, the collection of matter has been very great. In one case of inflammation of this gland, suppuration took place in both lobes, pus continued to be secreted, the abscess for a length of time enlarged; the integuments slowly dilating, till they came to form a large pouch, which hung over the sternum, containing some pounds of purulent matter. At this time my brother saw the woman. The abscess showed not the least tendency to burst, but hectic was considerably advanced. On this account he advised that it should be punctured, and the contents drawn off, in the manner recommended by Mr. Abernethy, in the treatment of psoas abscess. To this proposal, she most positively refused her

consent. For a fortnight, therefore, she lingered on, each day becoming weaker, and each day finding the difficulty in breathing and swallowing increased. At last the abscess burst, and fully discharged its contents. So soon as all the matter was evacuated, she felt much relieved: her appetite improved, and the hectic decreased. By retaining the sides of the cyst in contact, adhesion was promoted, and by attention to diet and the use of medicines, the discharge was kept moderate, and ultimately she was cured.

In the case just described, the matter burst outwardly, this, however, does not uniformly happen; sometimes the abscess opens into the trachea, and at other times it works its way into the œsophagus.

When the thyroid gland is inflamed, the means usually employed for its resolution are to be employed. Where suppuration takes place, from the danger attending the bursting of the abscess into either the trachea or gullet, it is proper that it should be punctured so soon as we have clearly ascertained that pus is formed. Where the inflammation has been simple, the wound heals readily, but sometimes the affection of the gland is connected with a peculiarity of constitution which retards the cure. In scrophulous patients, after the abscess has burst, or has been opened, an induration and enlargement of the rest of the gland is apt to continue. This is to be treated as we would other swellings of a similar nature.

Enlargement of the thyroid gland, dependent on chronic inflammation, is not unfrequently met with after parturition. This complaint occurs as often after healthy, as after diseased labours. Without any obvious cause, and without much pain, the gland slowly enlarges, nor does the tumour, till large, occasion much uneasiness. I have seen the swelling, after acquiring the size of a small orange, remain for several weeks stationary, and then begin to decrease, and continue to diminish, till at length the gland recovered its natural size. It has been known to suppurate. It requires no peculiarity of treatment.

It has already been mentioned, that the thyroid gland is naturally cellular, and that these cells are filled with a fluid, varying in its colour at different periods of life. Sometimes this fluid accumulates in an individual cell, giving rise to dropsy; a disease which is to be distinguished by the perception of fluid, and, when the tumour is large and its coverings thin, by its transparency when examined by candle-light. The diagnosis is, however, more difficult, where the fluid is tinged with blood, as has occurred both to my brother and to myself. Dr. Monro, jun. also informs me, that he has found this gland filled with blood, an affection which Portal has likewise observed. This author, when mentioning the various states of the thyroid vessels, adds, "et meme dans l'interieur de cette

glande on trouve quelque fois une matiere noirâtre, comme du vrai sang vieneux un peu concret."

Dropsy of the thyroid gland may be cured either by incision, or by puncturing the cyst, drawing off the fluid, and injecting equal parts of wine and water. Dr. Monro, sen. mentioned in his lectures, that he had seen a dropsy in the centre of the gland, complicated with bronchocele cured by a seton, although the glandular swelling still continued.* Where it is an object to avoid forming a cicatrix, the fluid may be sometimes removed, by the application of a solution of the muriate of ammonia in cold water.

Bronchocele is another affection of the thyroid gland, which is frequently met with. It is of a very indolent disposition, seldom suppurating, and often continuing for a great length of time, without producing so much inconvenience as might be expected, from the size of the tumour. In this complaint, the gland does not appear to be materially changed in its texture. In its healthy state, numerous small cells are found in its substance, filled with fluid. In bronchocele these cells still exist, but they are greatly enlarged, and they now contain a glary fluid, which, by immersion in alcohol, is readily coagulated.†

* Manuscript notes taken by Dr. Brown.

† Baillie's Morbid Anatomy, Appendix, p. 29, and Baillie's Plates, Fasibulus, 2d, Table 1st.

Bronchocele is met with in every different situation in life, but it is more frequently observed in some countries than in others. In Switzerland, many individuals are found, in whom the mental faculties are debased through every shade to the lowest degree of fatuity. These creatures are called Cretins. A considerable portion of the Cretins have an enlargement of the thyroid gland; hence Fodéré,* and several other respectable authors ascribe the affection of the mind to the state of the thyroid gland. For this, however, there appears to be no foundation, since the mental faculties are from birth weak, and in many the fatuity is complete, where there is no enlargement of the thyroid gland, or where the tumour is not bigger than a walnut; a size which can have no influence in retarding the circulation to, or from the brain. Besides, we have the direct testimony of Dr. Reeve,† that in those countries where Cretins are numerous, many people of sound and vigorous minds have bronchocele. Facts, therefore, will lead us to consider the combination of bronchocele and cretinism as accidental; nor shall we have much hesitation in admitting this, when we remember, that in some parts of this country, bronchocele is very frequent, where cretinism is seldom if ever met with.

* Essai sur le Goitre, et Cretinisme, par M. Fodéré.

† Dr. Reeve's Paper on Cretinism, Edin. Med. and Surgical Journal, vol. v. p. 31.

Cretinism is supposed by Pinel, who has very clearly described this disease in his work on mental derangement, to arise from the state of the atmosphere. This author has observed, that where cretinism prevailed, the air was hot and moist; an observation corroborated by Dr. Reeve, who adds, that filthiness, and neglect of moral education, have no small share in debasing the faculties of the mind. That these causes are sufficient to induce fatuity in its various shades, we can readily believe, but we know that bronchocele may take place without their operation. In Derbyshire the disease is endemic.

Prosser, who has described this complaint, informs us, that the tumour generally begins between the eighth and twelfth year, that it enlarges slowly during a few years, till at last it augments pretty rapidly in size, and forms a bulky pendulous tumour. The pain attendant on this swelling is but trifling, and in the incipient stage of the complaint, the gland is compressible and moveable, but latterly it becomes solid, and adheres to the neighbouring parts.*

This author, whose account of the origin, progress, symptoms and termination of bronchocele, it is to be regretted, is neither full, clear, nor satisfactory, tells us, that the tumour generally induces permanent dyspnœa; that by hurrying the breathing, the difficulty is augmented, and

* Prosser, page 4.

where the swelling is very large, it occasions wheezing. According, however, to his own testimony, these are not uniform occurrences; sometimes even where the gland has been much enlarged, the difficulty in breathing has been trifling. As he is silent with respect to the locality of the tumour, and forgets to mention the state of the muscles in these cases, we can only, from the result of other instances, conjecture, that it was occasioned, either by the position of the swelling, or by the condition of the muscles. Had these circumstances been explicitly mentioned, we would, I believe, find little difficulty in accounting for the diversity of effect produced.

When the lateral lobes of the gland are alone affected, a fossa will be formed in the front of the neck, during each time that the patient swallows a mouthful of food. Some consider this as the most unequivocal symptom of bronchocele, but it is not a uniform occurrence. Indeed, where the cross slip is equally enlarged as the lateral lobes, this hollow cannot, and never is distinctly formed. The resistance afforded by the tumour, prevents the elevation of the larynx from taking place in a due degree, and consequently only a slight hollow is produced.

Where one lateral lobe is alone enlarged in bronchocele, where it is dropsical, or where it contains a collection of inky fluid; the swelling, by its extension towards the side of the neck, is gen-

erally placed in front of the common carotid artery; and from its action, the tumour, as in enlargement of the concatenated glands, receives an impulse, it seems to pulsate, it resembles aneurism, but may readily be distinguished from that disease.

As a reference to individual cases is always to be preferred to general description, I shall, to illustrate some points connected with disease of the thyroid gland, relate the following case, which I had an opportunity of examining a few years ago. The person, a female, was far advanced in life, and the bronchocele was pretty large, the right lobe of the thyroid gland was as large as a full sized orange, elastic, soft in its consistence, and uniform in its surface. In regard to its position, I may mention, that when the head was bent back, its upper extremity was placed just three finger breadths below the angle of the jaw, and its termination was only one finger breadth from the clavicle. It measured from above to below five finger breadths. A considerable portion of the tumour lay anterior to the margin of the sterno-mastoid muscle; a part of it was covered by that muscle, and the rest extended backward from beneath the muscle, into the triangular space between the sterno-mastoid, the trapezius, and the clavicle. The tumour was moveable, the skin covering it was free from discoloration, and the muscles were in no degree rigid.

In the natural position of the left lobe a round knob was perceived, having apparently little connexion with the general swelling. Just over the œsophagus another knob, about the size of a hazel nut, was distinctly felt, and by pressure could be moved about. Beneath the sterno-mastoid muscle the enlarged gland was lobulated and clustered into small processes, precisely resembling a chain of enlarged concatenated glands. Indeed, had I alone trusted to the impressions received before dissection, I would have been led to believe that the lymphatic glands of the neck were actually swelled, and besides that several of the conglobate glands placed behind the sterno-mastoid muscle, between it and the trapezius, were also affected; for into that space processes from the left lobe of the thyroid gland extended.

When the integuments and the fibres of the platysma myoides, which were pale and flabby, were removed, the cervical fascia was exposed. It was slightly thickened, but could hardly be said to be firmer than in its natural state. The whole extent, however, of the tumour, was closely embraced by a firm, strong, and aponeurotic capsule, which had very little adhesion to the gland.

Before examining further, the arteries and veins of the neck were filled with wax. The following are the notes taken at the time I dissected the body:—

"On the right side, the common carotid is covered by the tumour, till it has reached to the level of the upper margin of the thyroid cartilage. At this spot the tumour terminates, and here, from the tracheal side of the external carotid, the upper thyroid artery arises. It ascends along the middle region of the neck, till it reaches opposite to the horn of the os-hyoides, which implies that it is at that part where it is covered merely by the skin, platysma myoides, and fascia. Having reached this point it hoops round the upper thyroid vein, and then makes a sudden turn down to the thyroid gland. It is a vessel nearly as large as the carotid itself. The right inferior thyroid artery is nearly as large, and it touches the gland about two finger-breadths above the clavicle, at a part where it is covered by both the sterno-mastoid and sterno-thyroid muscles. On the left side the arteries are not so large as on the right; but they are, from the greater flatness and extent of the tumour on that side, more completely covered. The veins over the swelling are dilated and very numerous, but neither the external nor internal jugular veins are much enlarged. On both sides the nervus vagus and sympathetic nerves were much pressed by the tumour, and on both sides the nerves were thickened. I carefully examined these nerves, and found that the medulla was not increased in quantity, it was the neurilema alone which was thickened."

This is a case which may afford some useful points to reflect on; it illustrates facts which ought to be impressed on the mind of every surgeon; but above all, on the minds of those who are especially in the habit of performing operations. Have not we seen, that on the left side of the neck prominences jutted out from the thyroid gland? Has it not also been mentioned, that previous to dissection, no one could have suspected that these were not formed by swelling of the concatenated glands? Let these circumstances be remembered, for they are important, and would have much influence on our proceedings, if called to visit a patient in a similar situation. I believe, also, that it will assist in explaining some of the cases of bronchocele, said to have been combined with swelling of the lymphatic glands.

Had a surgeon been called to examine the present patient before death, he would, if he had formed an opinion that the knobs on the left side of the neck were really enlarged glandulæ concatenatæ, have resolved, without hesitation, that no operation could, with a prospect of success, have been undertaken. But were he acquainted with the nature of the disease, and had he known that the apparent swelling of the lymphatic glands was truly a deception, arising from projections from the surface of the diseased thyroid gland; and had he been aware that the whole extent of the tumour lay inclosed in a capsule, to which it had little

adhesion, he might, perhaps, have been inclined to view the question of operation in a different light.

It is proper to know that every tumour is originally contained in a capsule of fascia, provided the swelling arise from enlargement of any glandular organ, and also that the adhesion of the one to the other is, in indolent tumours, for a considerable length of time, slight. As the disease, however, advances, the capsule and its contents become blended into an unseemly mass; they are completely incorporated, and assume a similar appearance, and ultimately, from the surface of the sheath, projections shoot among the interstices of the muscles, vessels, and nerves, to which they become intimately attached, rendering the excision of the morbid parts next to impracticable. But, in the present instance, no such adhesion had taken place. Indeed, the union between the capsule and the gland was so slight, that I found no difficulty whatever in insinuating my finger between the cyst and the gland, and detaching the one from the other, till I reached the thyroid artery, round which I could most easily have passed a ligature. With the gentlest effort with the finger, I separated the tumour all round, and, in succession, touched the four arteries, and brought into view the trachea and gullet, which were forced so much to the left side, that the right margin of the former occupied what ought to have been the position of the left edge, and the œsophagus

was still further displaced. When in this way I had ascertained the practicability of extirpating this tumour, I made an incision into its substance, and found that it presented precisely the appearances belonging to bronchocele.

It has been proved, from the inspection of the connexions of the enlarged thyroid gland in this body, that it might, with a possibility of advantage, have been removed by operation. Although this would have been practicable in this instance, still in others, the tumour may be so situated, and may have formed such adhesions, as to preclude any attempt at extirpation. The respiration and swallowing may be both much impaired, and every remedy may have been tried, and failed, either to procure the absorption of the tumour, or suppuration. Under such circumstances, is it necessary to leave the patient to die a miserable and lingering death? Or is there any expedient which may reasonably be employed to protract life, and to render existence more comfortable? Such an expedient is within our reach. The dissection of this case, proves its practicability. There it has been mentioned, that the upper thyroid artery was greatly enlarged; that it was even nearly equal in size to the carotid, and also that it lay very near to the surface. Its coverings were few and thin; the pulsation of the artery strong and distinct. Placed as that vessel almost always is, no one would have experienced difficulty in reaching it.

The pulsation itself would be a guide, which would conduct us easily and safely to the vessel. No nerve of any importance would come in the way; no muscle would require to be displaced; no depth of substance to be divided; no intricate dissection to be performed. A small incision would expose the vessels on which the tumour, in a great measure, depended for its support. It would have been easy to carry a ligature round them, to intercept the flow of blood to the gland above; and till the inferior vessels enlarged, the tumour would have more slowly increased in size. Not only so, but it will sometimes be actually reduced, and life protracted.

A surgeon who would decline extirpating a large bronchocele, would have little dread in tying the superior thyroid arteries. Not thyroid arteries, as in health, small, indistinct in their pulsation, and requiring, consequently, a more intricate dissection to expose them, but arteries too large to be missed. I would not, however, rest the question regarding the propriety of this procedure on conjecture; nor would I appeal to the healthy or morbid connexions of the vessels alone, to prove that they may be safely tied, when the operation has actually been performed on the living subject, and in so far as concerns the tumour, with a favourable result, although we must regret that the patient died.

The operation to which I allude, was performed

by Mr. Blizzard,* who tied the arteries going to an enlarged thyroid gland, and in a week the tumour was reduced one third in its size. The ligatures then sloughed off; repeated bleeding took place from the arteries, and by the extension of the hospital gangrene, the carotid itself was laid open. The patient died, yet this does not militate against the repetition of the experiment; the same might have happened from merely opening a vein, and in the confined air of an unhealthy hospital has actually happened.

In bronchocele, or in any other indolent swelling of the thyroid gland, which, by its mechanical effect on the trachea or gullet, is endangering life; it has been shown, that the morbid parts may, if not large, or if they have not formed attachments to the large vessels and nerves, be extirpated; and where too big to admit of extirpation, its nutrient arteries may be tied. Mr. Blizzard's case proves the immediate effect of intercepting the blood; it shows that the tumour will decrease in size. We can hardly, however, expect that in an organ where the vessels anastomose so freely, the circulation will not be soon re-established, and the swelling begin to enlarge.

A tumour, which before its nutrient arteries were tied, was so large, that it would have been folly to have attempted its excision, may, by depriving it of the circulation along the two upper

* Manuscript Notes taken by Dr. Brown.

thyroid arteries, be so reduced, as to allow the operation to be performed, provided its connexions do not prohibit us from interfering. It is not, therefore, the immediate effect on the disease which we are to look to in tying the arteries, we are to anticipate the command which it may ultimately give us over the tumour; and consequently, where the swelling, although very large, has not formed adhesion to the large cervical vessels and nerves, we are to urge the expediency of tying its nutrient arteries, as a prelude to other proceedings. We shall not, however, in bronchocele, have occasion often to extirpate the thyroid gland, neither shall we require in many cases, to tie the thyroid arteries. Before we do either the one or the other, we must employ more lenient measures; and it is to be remembered, that the younger the patient, the greater is the probability of our accomplishing a cure. Indeed, where the disease has begun in very young females, it often spontaneously disappears, when the menstrual secretion is established.

In the treatment of bronchocele, repeated topical detraction of blood from the tumour, is highly beneficial. Electricity also, has sometimes a marked effect, but there is no remedy which I would more strongly advise, than regular and long continued friction over the tumour. By perseverance in this plan, a bronchocele treated in London was materially reduced in the course

of six weeks. Its good effects I have likewise witnessed myself; and it is a remedy highly recommended by Girard in his "Traite des Loupes." It has also been much used in scrophulous tumours by Mr. Grosvenor of Oxford, and by Mr. Russel of Edinburgh."* Blisters also, I have employed, and found useful. Caustic is also sometimes empirically employed to destroy the tumour; but is seldom used by regular prac-

* In employing friction, flannel covered with hair powder ought to be used, and the parts ought to be carefully rubbed at least three times a day, and never for a shorter period than twenty minutes each time. By perseverance in this treatment, it is sometimes astonishing how much effect is produced on even the most obstinate swellings. A gentleman some years ago, was cured by repeated blisters and friction, of a large cluster of tumours in the neck, which had resisted every other treatment, and where blisters by themselves, had produced no diminution in their size. The glandular swellings in this case, originated from a rawness of the tonsils and fauces. This was not dependent on any specific disease. Many local remedies, were, without advantage, applied to the throat, and the neck was frequently blistered; still the complaint gained ground; the debility increased, and the patient was at length informed, that he had but a short time to live. While in this situation, an empiric was recommended to him, as very successful in the treatment of similar cases. By his advice, he was removed to the country. A large blister was applied over the enlarged glands, and so soon as it rose, the practitioner cut away the separated cuticle, and briskly rubbed the inflamed surface with coarse tow. Then he allowed the sore to heal; when this was accomplished, another blister was applied, and treated in a similar manner. This rude treatment, to which he occasionally added the use of purgatives, was persevered in during a length of time. Under it the tumours slowly decreased; the excoriation of the tonsils and fauces lessened, and after a few months, all trace of disease was removed.

About six years afterwards, the gentleman died of a complaint, altogether unconnected with the primary disease.

This case promised but little; the patient, when he put himself under the care of the empiric, had almost no hope of recovery; the disease was gaining ground, and every remedy which reflection could devise, had in

titioners, although recommended by Celsus.* It is said to have succeeded where every thing else has failed. Mr. T. Blizzard, I am informed, recommends the application of a gum plaster, which, from its efficacy in other indolent tumours, I can readily believe, may be advantageous in bronchocele. I have also seen good effects from friction, with an ointment composed of one ounce ung. hyd. to one drachm camphor.

In Switzerland, great reliance is placed on the use of burnt sponge in the cure of bronchocele, and various formulæ are in repute. I have seen it employed, but cannot say that I ever observed any effect from it, even where conjoined with mercurial preparations. I would give nearly the same opinion, of all internal remedies which are used as specifics in this disease. I would place my dependence on local applications, and such remedies as tend to keep the action of the stomach and bowels regular. In two cases of bronchocele related by Dr. Clarke, the patients were cured by "the steady use of the compound plaster of ammoniac and mercury, conjoined with the internal exhibition of the burnt sponge, and occasional purgatives."†

vain been tried. Even the very medicines which ultimately effected a cure, had been employed, but from not being duly persisted in, nor sufficiently far pushed, they had failed. This affords a useful lesson; it holds up to our view, that temporizing treatment will not succeed in obstinate cases; there the most vigorous, and what mistaken humanity would term harsh measures, must be adopted. Such alone will overcome the morbid action.

* Celsus, lib. vii. cap. 13.

† Edinburgh Surgical Journal, vol. iv. p. 280.

Carcinoma, and fungus hæmatodes, are also affections to which the thyroid gland is subject. In carcinoma, the gland without any obvious cause, but sometimes after a blow in the neck, begins to enlarge. The tumour increases slowly in size, is irregular on its surface, and of a stony hardness, and from the first the pain is acute and lancinating, extending chiefly upward along the neck. The breathing and swallowing are greatly affected; the one, however, generally more than the other, according to the part of the gland which is diseased. The muscles are rigid; they are firmly fixed to the tumour, and in the latter stage, the integuments are matted and puckered, which never happens in even the largest bronchocele. A sanies fluid sometimes collects in cysts, near to the surface; these enlarge and force back the mass of the tumour against the parts behind; the patient suffers the greatest distress, for he can hardly breathe, and as to swallowing any thing but fluids, it is out of his power. When seemingly about to die, the most prominent of the sacs gives way, a small discharge of bloody ichorous matter relieves for a short time, but the symptoms soon recur, and are relieved by the successive bursting of the cysts, till at length even that ceases to relieve.

Widow M'Leod, a poor woman above sixty years of age, ascribed the beginning of a tumour of the thyroid gland, "to a stress," to use her own expression, "of the neck," which had taken place

nearly thirty years before. During all that time, she carried a tumour about with her, not productive of very great uneasiness, yet still disturbing her. Latterly, the swelling increased very rapidly, and without any apparent cause, enlarged to such a size, as besides producing a great degree of deformity, to endanger her life. The state of the tumour at that time, I do not very fully know, but her surgeons were much astonished, when she told them shortly afterwards, that the swelling was gone; they inquired how that had taken place, and were informed, that it had been occasioned by the bursting of the skin, and subsequent discharge of a small quantity of bloody serum.

They, like the patient, flattered themselves that the cure would soon be complete. At the distance of six months after that occurrence, the woman came to show me the tumour, which had returned, and was now worse than ever. For two nights before I saw her she had been unable to lie in the recumbent position, or even to procure sleep in any posture. She was in constant uneasiness, tormented with a tension and confusion in her head, and worn out with apprehension of suffocation. She neither knew to whom to apply for relief, nor what to do to procure a momentary respite from suffering. She could not fetch her breath without dreadful gasping, neither could she swallow till after tedious mastication, and even

then the morsel was thrust over with fear and trembling, for she verily believed that some time or other it would choke her.

The expression of her suffused purple countenance was characteristic of keen anxiety about her fate; she dreaded the struggles for breath which she soon felt she would be obliged to make, if something was not done to remove the tumour. No one could, however, hold out any prospect of this kind, nor afford her more consolation than a promise, that in the eventful period to which her disease was drawing, every thing would be done which it was possible to accomplish to relieve her.

When I saw her the tumour jutted out, as big as the fist on the left side, and it felt as hard as a stone. On the front of the neck there was an ugly puckered sinus, just over the cross slip of the thyroid gland, from which a bloody ichor was discharged, and she always felt easiest when this discharge was most profuse. The tumour on the right side was as large, but more flattened than on the opposite, and on the outer edge of it the carotid artery was felt, quite superficial, labouring with rapid motion, and hard and firm as a cord. It formed, when dilated, a rope about the size of the little finger. On the opposite side the artery was also pushed outward, though not to the same extent. It felt deeper, and was more restrained in its action. The tumour was productive of dreadful irritation above the larynx, inducing

severe and reiterated fits of coughing, during which she said "her head seemed ready to burst," and the eyes to start from their sockets.

Various medicines were tried, but the only relief she obtained, was from large doses of the ammoniated tincture of opium.

She continued during some months gradually becoming worse, and at length died in dreadful agony.

On inspecting the body, the thyroid gland was found to be much enlarged. On the right side there were several pretty large cysts attached to the gland, filled with bloody serum, and studded over on their inner surfaces with little cartilaginous knobs. On this side, the internal jugular vein, from a little below the angle of the jaw down to near the chest, was completely obliterated. The blood was sent across to the opposite vein by a large communicating vessel which ran parallel to the body of the hyoid bone. The substance of the sympathetic and eighth pair of nerves was thickened and indurated, and the trachea and larynx were flattened by the pressure of the tumour. The substance of the tumour itself was distinctly carcinomatous. The membranous intersections, and the softer texture of this disease, were too characteristic of its nature to be mistaken.

From the description of the spongoid tumour given by my brother,* and of the fungus hæma-

* Dissertations on Inflammation, by John Burns, vol. 2.

todes by Mr. Hey,* we learn that the disease begins with a small colourless swelling, elastic when touched, firmer the deeper it is seated, and which, if covered by a fascia, is very tense. As the tumour increases, it acquires more and more of its characteristic trait, it becomes more elastic than formerly, generally projects more at some points than at others, and seems to contain within it a quantity of fluid. This is, however, a deception; from a puncture, only a very small portion of bloody ichor issues, a quantity so immaterial as not to lessen the size of the swelling.

The prominent points are the most elastic, are covered with the most diseased integuments, and are generally marked with small varicose veins, from which they derive a bluish livid colour. Beneath these diseased integuments the rudiments of fungi are placed; this being a complaint in which there is a disposition to form fungus, previous to the bursting of the skin. The fungi are darker coloured than the rest of the tumour, which consists of a light grayish, medullary looking substance, disposed in irregular cells, which are formed by laminæ, arising either from the bursæ of the joints, from a fascia in the neighbourhood, or from the periosteum of the bones themselves. Where the tumour has existed for a length of time, the parts in the vicinity come to suffer. The bones are softened, their cancelli are removed, and their place

* Observations in Surgery, by Mr. Hey.

supplied by a soft mass of cineritous-looking matter; the muscles are entirely changed, they lose completely their fibrous texture, but they still retain their shape. They are either of a dusky white or brown colour.

When the integuments over a protuberance burst, a small quantity of bloody ichor is discharged, a fungus rapidly sprouts from the orifice, over the margin of which it is soon folded. From the surface of this fungus a profuse hæmorrhage frequently takes place, and at all times it is smeared over with a film of bloody lymph.

About this time the patient begins to suffer from hectic; formerly his nights had been restless, owing to the acuteness of the pain; now he is prevented from sleeping by the febrile exacerbations, equally as by the local pain; and now the lymphatic glands begin to swell. They assume the same morbid condition, but the secondary affection is more rapid in its progress than the primary.

I have thus detailed the general appearances presented by fungus hæmatodes, a disease, which, although fully established to be altogether different from cancer, is yet, perhaps, not perfectly understood. There are several of its features with which we are by no means familiar; we are acquainted with its more common character, but many of its modifications, I am fully persuaded, remain to be demonstrated. Mr. Wardrop, in his

late work on Fungus Hæmatodes, has very accurately pointed out the differences in texture in carcinoma and this disease; he has shown them to be very dissimilar. This is one step gained, but there still remain important matters for investigation; we have yet to learn wherein cancer and fungus hæmatodes differ in their external appearances; we have also to ascertain whether these two diseases can, or ever do exist at the same time in different parts of the same body, or in different parts of the same organ; we have also to inquire whether fungus hæmatodes, and medullary sarcomæ be identically the same diseases, or whether they are really dissimilar in their nature.

These are points of considerable consequence, and were we able to solve them, it would materially improve our knowledge, not only of these complaints, but it would also elucidate the doctrine of tumours in general. Unfortunately, however, we are hardly possessed of a sufficient number of facts, to decide on any of these questions. What little information we have obtained from the inspection of these diseases in the living body, and from the examination of the morbid parts after death, I shall shortly detail. I cannot, however, do this, without making an apology for their insufficiency; indeed, they are more to be considered as hints to future observers, than as affording any very defined idea of the subjects in question.

In carcinoma, the tumour is solid, irregular on its surface, and incompressible; whereas, in fungus hæmatodes, the tumour is yielding, it is elastic under the finger; it is indeed irregular on its surface, but so far from the prominent points being the most stony as in carcinoma, they are really the most compressible. They even communicate an obscure feeling of fluid. In carcinoma, after the skin has given way, the margins of the ulcer are thin, livid, glassy, and often retroflected; but in fungus hæmatodes, I have never seen a case in which the edges of the sore, were in even the slightest degree reflected. Generally, in the latter disease, the fungus, in the course of a few days, is spread over the margin of the opening, through which it has passed, and I have repeatedly seen the neck of the fungus so closely embraced by the skin, that a profuse venous hæmorrhage was produced from the surface of the cauli flower-like excrescence. In carcinoma, a fungus does also sometimes spout out from the ulcers, but from the sloughing of this, and of the mass of the tumour, a deep cavern is formed, bounded by livid, undermined, and ragged, and occasionally reverted edges. In fungus hæmatodes, I never knew a loss of substance, except where the neck of the fungus was tightly begirt by the skin; then, indeed, the fungus has dropped off in the same way that a polypus decays, when a ligature is fixed round its root. Carcinoma and fungus hæmatodes resemble

each other in some features; in both, there is a total destruction of the natural texture of the part affected; in both, there is a disposition to form fungus, but still, the appearance of the fungus is different in the two diseases. "The fungus, instead of having a firm texture, like that which sometimes arises from the cancerous ulcer, is a dark red or purple mass, of an irregular shape, and of a soft texture, is easily torn, and bleeds profusely when slightly injured."* In carcinoma, the fungus sometimes sloughs from some increased action in the diseased parts, but in fungus hæmatodes, the fungus progressively enlarges, and only sloughs from accidental causes.

In their external characters, therefore, we perceive a marked difference between carcinoma and fungus hæmatodes. The internal differences are not less striking. "The morbid growth in fungus hæmatodes, consists of a soft pulpy matter, which mixes readily with water, and is hardened by acids, and boiling in water. It has been also compared by all who have attempted to describe it, to medullary matter in colour and consistence."* "The colour of the tumour when small is generally of a pale grey, or brownish red hue; but when it is large, the different portions which are separated from one another by capsules, assume very different appearances, the general mass being thus composed of a number of parts differing in colour

* Wardrop, page 186.

and structure. Some of these are of the colour and consistence of brain, some are of a deep yellow colour, and some of them have the colour and consistence of the boiled yolk of an egg: some portions are of a dark red colour, like masses of coagulated blood, and others more resemble liver."* Sometimes portions of it are excavated, the little cells containing a bloody fluid, and always the tumour is intersected by thin membranous septa, which separate the different lobes of which it is composed from each other. Sometimes several of these lobes are hard and cartilaginous, and in other instances they are ossified.

"The scirrhous tumour, from its commencement, is a hard, firm, and incompressible mass, which, by a minute examination, will be found to be composed of two distinct and very different substances. The one is hard and fibrous, the other more soft, and apparently inorganic.

"The fibrous substance composes the chief part of the scirrhous mass, and consists of septæ, which are opaque, and commonly of a paler colour, than the soft part. These septæ are very unequal in their length, breadth, and thickness, and disposed in various directions, so as to form sometimes a solid mass, and at other times, a greater or lesser number of irregular cavities, which contain the soft part.

"The soft or inorganic part is sometimes semi-transparent, of a bluish colour, and resembling in

* Wardrop, page 106.

consistence, softened glue. In other cases, it is softer, somewhat oleaginous, and more resembling cream in colour and consistence.

"The proportion and mode of distribution of these two substances are very different in scirrhous affections of the same, and of different organs; and give that great variety which may be observed by examining a number of tumours of this kind. In some, the fibrous part is most conspicuous, and is condensed into a very solid form, having the appearance of a nucleus, from which septæ come off in all directions, and giving a section of the tumour a radiated appearance. This is, perhaps, the most usual form of the disease: in some, the tumour is very irregularly shaped, and nearly a uniform hard mass, in which scarcely any defined structure can be traced. In some, the fibrous part has a cellular appearance, the cells being filled with the soft pulpy matter, which can be readily pressed out with the finger. In others, it has cysts formed in it of various dimensions, which generally contain a bloody or dark chocolate-coloured fluid, and have sometimes a fungus tumour growing within them. It occasionally happens, too, that parts of scirrhous tumours acquire a great degree of hardness, being converted into a substance resembling cartilage, in which bony depositions are sometimes formed.

When scirrhous tumours are formed in the substance of a gland, their limits cannot be

accurately determined, the two structures being apparently inseparably connected. At other times, they condense the cellular membrane, which is in their immediate vicinity, and acquire a more circumscribed appearance."*

I have thus, from my own observation, and that of others corroborated by my own, endeavoured to draw the distinction between the external and internal characters of carcinoma and fungus hæmatodes. It has appeared that the features in these diseases are distinct and well defined. If, therefore, we meet with one part of a tumour presenting the decided marks of carcinoma, and another part indelibly impressed with the lineaments of fungus hæmatodes, we must surely conclude, that both these diseases have coexisted in the same body. This remark I have been led to make, from the result of careful dissection which I made of a diseased breast, lately extirpated by Dr. Brown. One extremity of this organ presented the decided features of fungus hæmatodes, while the other end displayed the peculiar and characteristic texture of carcinoma. A single case, it may be said, is not sufficient to establish so important a fact; yet, although I cannot speak positively as to any other instance of a similar combination, I am pretty certain that such have come under my observation. Neither is it inconsistent with established facts, to suppose that one

* Wardrop, page 181, et seq.

part of the tumour may be of one specific nature, and another of a different. From what I myself have witnessed, I believe that one part of a tumour may be scrophulous, while another may be of the nature of fungus hæmatodes.

It seems that fungus hæmatodes has now become a general name for all non-descript tumours, as heretofore scirrhous was. Many dissimilar affections are thus huddled together. No two surgeons have the same ideas regarding the morbid texture of this disease; therefore, whatever does not resemble any of the complaints with which they were already familiar, must be fungus hæmatodes. My brother and Mr. Hey gave an account of the general appearances presented by this affection. Mr. Abernethy next published an account of a disease which he called medullary sarcoma. Surgeons immediately inferred, because some features were common to fungus hæmatodes and medullary sarcoma, that they must be identically the same disease. That they are not, however, is pretty certain, from the nature of the morbid parts themselves.

In fungus hæmatodes the body of the tumour is intersected by numerous membranous bands, but in medullary sarcoma the mass is of uniform pulpy consistence, and resembles in colour the cortical portion of the brain. In the former, we can wash out the soft brain-looking matter, while the membranous bands are left remaining; if we

treat a section of the latter tumour in a similar manner we leave only the capsule in which it was contained, and a number of floculi hanging from its inner surface. I have seen and examined several specimens of medullary sarcoma, and uniformly with the same result; but the best example of it I ever saw was from the ovarium of a lady about forty. The tumour was very large, its centre contained a considerable quantity of glary fluid, and the surface of the cyst which contained this was studded over with numerous projections, each about the size of an orange. When these were cut into I found them composed of a pulpy organized mass of a medullary consistence, and of various shades in different places. Some parts of the tumour were of a dark purple tinge, and others were of a dirty yellow hue. The line of junction of the dark coloured with the brighter substance was abrupt and well defined.

Mr. Abernethy, when treating of medullary sarcoma, informs us, that "the tumour in those cases of the disease which I have most frequently met with, has been of a whitish colour, resembling, on a general and distinct inspection, the appearance of the brain. The disease is usually of a pulpy consistence, and I have, therefore, been induced to distinguish it by the name of medullary sarcoma. Although I have more frequently met with this disease of a whitish colour, yet I have often seen it of a brownish red ap-

pearance. Which is the most common I cannot decide, the structure and feel of both are the same, and their progress is also similar, they are, therefore, to be considered as varieties of one species."* That the membranous septæ which are never wanting in fungus hæmatodes, were not existing in the disease described by Mr. Abernethy, was accidentally demonstrated in one of Mr. Abernethy's dissections. "I took out the lumbar glands and put them in water; and the weather being extremely hot when I examined them next day, I found that all the unorganized deposited matter which had enlarged them had become putrid, and was washed away, leaving the capsule of the gland, and a congeries of flaculent fibres, occupying the anterior of it."†

That the structure of medullary sarcoma is different from that of fungus hæmatodes, is, I think demonstrated; we have, however, to regret, that they are equally intractable in their disposition, and equally fatal in their issue.

Medullary sarcoma is sometimes met with in the thyroid gland. It begins with an elastic swelling, at first uniform to the touch, but by degrees, becoming unequal on its surface; the muscles are rigid, the integuments are tense, and in the advanced stage they are dark coloured; and over the prominent parts are bestudded with

* Abernethy's Observations on Tumours, page 51. † Ibid, p. 56.

varicose veins, which I have noticed where the tumour was not larger than a billiard ball. At the same time the looks were squalid, the nights restless, the respiration difficult and wheezing, deglutition much impeded, the pulse frequent, the pain of the tumour great, lancinating, and almost incessant, although liable to exacerbations. The patient generally dies before the tumour has become very large, but to this there are occasional exceptions. I have once seen the tumour occupying the left side of the neck, commencing a little to the right side of the junction of the alæ of the thyroid cartilage, projecting outward beyond the transverse processes of the cervical vertebræ, descending till it came in contact with the clavicle, and stretching upward till it touched the margin of the lower jaw bone.

The patient was a most miserable creature, unable to breathe or swallow, except with great difficulty, and with many struggles. Her surgeons visited her, they saw her deplorable condition, they advised one thing after another, and each did as little good as the one which had gone before:—They allowed the swelling to increase to the enormous size I have mentioned, and then, to give momentary respite, they made a long and deep gash into the tumour. They practised an old and pernicious expedient, which cannot be too strongly reprobated. It was an operation for which there could be no apology. The tumour

was evidently of a specific nature, and the surgeon ought to have known, that to cut into such a mass, and not at the same time to remove it entirely, was a certain way to exasperate the disease, and to destroy the patient.

I must not quit the history of this case until I have explained some other points connected with it. I must advert to the position of the common carotid artery, which was deeply buried amidst the diseased substance. It lay imbedded in the very centre of the tumour, and in making the extensive wound into the swelling, the knife had penetrated to within the hundredth part of an inch of the coats of the vessel; how it escaped injury is hardly conceivable: it was not from the knowledge of the operator, who hardly knew that there ought to be an artery in the neck, far less could he appreciate the changes which would take place in its locality from disease.

The carotid artery being placed in the body of the tumour, is neither very rare in occurrence nor very difficult to explain. It is, indeed, a natural consequence of the extension of the tumour laterally; yet it will not happen in every tumour: it will only occur in those cases where the consistence of the morbid parts is soft. When the tumour is firm, it pushes the artery, nervus vagus, and internal jugular vein, aside. When it is soft, these, as in the present instance, sink

into its substance. This a fact which ought never to be forgotten. In carcinoma it never takes place; in fungus hæmatodes it sometimes occurs, and in medullary sarcoma, I have more than once proved it by dissection to have happened.

These are diseases for which there is no cure, except the use of the knife; but it is only under certain circumstances, that it can be employed. It is only, when, from the limited connexions of the tumour, it is in our power to remove completely the diseased substance, that we can conscientiously recommend its use. Experience daily proves, that if the smallest particle of morbid matter be left behind, the diseased action spreads from it, as from a centre, the wound refuses to heal, the sore assumes an unhealthy aspect, it gleets out a profusion of abominably fetid ichor, and the patient soon dies, worn out by hectic. In the present case, the tumour might undoubtedly have been extirpated at its commencement, and that without much danger; but procrastination, and the employment of trifling remedies, permitted the period for active operation to pass by, and left to the surgeon only the melancholy task of witnessing the protracted sufferings, and miserable death of the patient: a death accelerated, and its pain aggravated, by the unskilful wound made into the tumour. Let this be impressed on the mind, for it will enforce

the necessity of having recourse to prompt and vigorous measures in similar cases.

In bronchocele, even when the tumour is very large, and even where the carotid is imbedded in its substance, we may palliate either by external remedies, or by tying one or more of the large arteries which nourish the morbid parts; but in the advanced stage of carcinoma, fungus hæmatodes, and medullary sarcoma, we cannot control the growth of the tumour. The arteries belonging to it are not enlarged in proportion to its bulk, nor would tying these destroy the specific action of the parts. Extirpation of the whole of the diseased substance, will alone secure the patient from its ravages; but this it is evident, can only be prudently undertaken in the early stage of the complaint: at a time when the tumour is small, and free from adhesion to the important vessels and nerves, which can readily enough be ascertained, in the same way that we discover whether an enlarged concatenated gland adheres to these parts.

Even, however, where the nature of the disease has been early ascertained, where the tumour, is still small and moveable, many entertain a dread at intermeddling with it; a dread founded on preceding failures, arising from unskilful management, and also from a review of the parts with which the tumour is in contact. It is, no doubt, an operation dangerous in its performance,

but it has been safely executed, and the life of the patient saved. In Paris, the right lobe of the thyroid gland has been successfully extirpated by Desault. Freytag informs us, that in his time, this gland had been completely removed, and the same has more lately been done in London. Nor was this more than we would have been led to believe and expect, from the favourable result of Mr. Astley Cooper's experiments on the inferior animals.

In extirpating this gland, an incision of an eliptical shape, if the tumour be large, or if the integuments be diseased, is to be made over it, with the long diameter directed from above to below. The surface of the swelling is next to be uncovered, by dissecting back the integuments on both sides. Then the finger is to be insinuated between the skin and the muscles, pushing it upward and backward, till it comes in contact with the thyroid artery, round which a ligature is to be passed with a blunt needle. In a similar manner, the other superior thyroid artery, and the two inferior vessels, are to be secured, where the whole gland is to be removed. By these ligatures we cut off the circulation into the tumour, and consequently are left at liberty to finish the operation, by cutting the vessels nearer to the morbid parts than where the threads have been applied, and by dividing the sterno-hyoid and thyroid muscles, above and

below the tumour, which is afterward to be detached from the trachea and gullet, by cautious working with the fingers. In this way, we may remove one or both lobes of the thyroid gland; but the operation is difficult, tedious, and not without danger. Where this gland is enlarged, it descends into the angular space, just above the sternum, and comes in contact with the arteria innominata, to which I have seen it adhere.

When the parts with which an enlarged thyroid gland is in contact, are attended to, we shall not wonder much, that the extirpation of this gland is rarely recommended. In front, it is covered with, and bound down by the sterno-hyoid and thyroid muscles; when it descends low, it touches the arteria innominata; on the left side, it is in contact with the gullet, and lies over the branches of the recurrent nerve; and on both sides, when it extends a little further out, it touches the carotid artery, the jugular vein, and the visceral nerves. To those, therefore, who are accustomed to do every thing with the knife, the extirpation of the thyroid gland must appear a formidable operation; but to one who knows how to use the scalpel, and where to substitute the fingers, the removal of the thyroid gland, although hazardous, does not appear impracticable.

Albucasis has related a case, where in extirpating a bronchocele, the large cervical vessels were divided. The patient died from excessive hæ-

morrhage. When we remember the rudeness of anatomical knowledge among the Arabians, their ignorance of the true nature of the circulation; and when we add to these, the size of the vessels in the vicinity of such a tumour, we shall not feel surprised at the result of this operation; nor can we, with justice, from its fatal issue, argue the impropriety of cutting out a diseased thyroid gland. Palfin* also informs us, that a young lady died during the extirpation of a bronchocele.

Prosser reprobates the excision of this organ, and adduces the cases of extirpation of the thyroid gland, witnessed by Gooch, to prove the impropriety of the operation. In the first case which Gooch saw, the patient was in a very unfavourable state. The person was reduced to extreme debility of the disease, and weakness was still further increased, by the profuse hæmorrhage which accompanied the removal of the morbid parts. Under circumstances such as these, we need not be surprised that the patient died within eight days after the excision of the gland, and more especially, when we learn that during all that time, the bleeding was never completely restrained.

In the other case, also witnessed by Gooch, the young lady lost a considerable quantity of blood during the operation; but in this instance, her life was saved by the assistants keeping up a constant

* Palfin Anatom. tom. ii. page 313.

pressure with the fingers on the divided vessels, for nearly eight days after the removal of the tumour. Gooch adds, that in this case, the surgeon was foiled in his attemps to secure the vessels by ligature.

These are the cases from which Prosser concludes, that on no account, ought the thyroid gland to be removed by operation. If, however, we attend to even the imperfect account which is given of them, we shall at once be convinced, that Prosser, misled by an abuse of the operation, inferred its inexpediency in every case. In both of these instances, the operation, without doubt, was most injudiciously performed. It has appeared, that in both cases the surgeon trusted to securing the arteries after the removal of the tumour; a plan by which the hæmorrhage would unquestionably be increased, by which the operation would be protracted, and the operator embarrassed. Had he, on the contrary, secured the four arteries before he attempted to remove the tumour; and had he then torn the diseased parts from their attachments, in place of using the knife in separating them, there is every reason to believe, that in the last case, at least, there would have been but little hæmorrhage. But even had this plan been adopted in the first case, the event would have been doubtful. For independently of the injudicious performance of the operation in this instance, the probability is, that the patient

would have died from the mere effects of the irritation produced on the debilitated frame, by the removal of the tumour; but when to this, we add a profuse bleeding during the operation, and a consecutive hæmorrhage, the event must necessarily, even in a stronger person, have been fatal. From the first case, therefore, we can hardly draw any fair conclusion; and from the second, the only inference we can draw, is, that eventually the operation may succeed, even where the extirpation of the tumour has been very injudiciously accomplished.

Wilmer, in his Essay on Bronchocele, says, "when we reflect upon the situation of the thyroid gland, and consider its numerous arteries, which increase in diameter in proportion to the enlargement of the part, we shall not be surprised at the difficulties that must attend its extirpation in a diseased state, and the danger there ever must be of incurring a fatal hæmorrhage."* These are the notions entertained by all who reprobate this operation, but they are founded on a mistake in anatomy. A diseased thyroid gland really derives all its blood from four arteries; if, therefore, the surgeon secure these, he will, in detaching the morbid parts, have nothing further to dread from bleeding arteries.† By venous

* Wilmer's Cases in Surgery, p. 243.

† The thyroid gland generally receives its supply of blood from four vessels, but we sometimes find a fifth sent to it by the arteria innominata. Where this anomalous vessel exists, it will usually be found entering the

hæmorrhage, he may still be incommoded, but it will easily be checked. Where, however, he employs the knife, and trusts to tying the arteries after he has divided them, he will unquestionably experience all the difficulty, and the patient will run all the hazard, that Gooch's did. The life of the patient will be saved, "only by having a succession of persons, to keep a constant pressure upon the bleeding vessels day and night, for near a week, with their fingers upon proper compresses, after the operator had been repeatedly disappointed in the use of the needle and ligature."*

Having in succession, attended to the relation of the different parts in the lower and middle regions of the neck, I am next led to inquire into those parts which lie above the digastric muscle. But here the muscles, glands, vessels, and nerves, are so much interwoven with one another, and so perplexed in their relations, that I hardly know how to explain them. Description cannot communicate a clear idea of their connexions, it can only present a mere sketch; a rough outline of

cross slip of the gland, just on the fore part of the trachea. This artery sometimes supplies the place of one of the regular thyroid branches. In extirpating the thyroid gland, these facts must be recollected.

* Gooch's Med. and Chir. Obs. p. 136.

the most prominent points. The details must be studied on the dead body; for it is by dissection alone that the student can hope to make himself familiar with surgical anatomy. Even the best and most spirited descriptions, convey but a very imperfect idea of the structure, and such an idea, as no one would think of employing as a substitute for actual dissection, more especially about the angle of the jaw. The few following remarks are, therefore, to be considered as hints, to be read preparatory to, or while examining the anatomy of the angle of the jaw, on the recent subject. As the relation of these parts is considerably influenced by the position of the cranium, it will be necessary to say a few words, respecting the mechanism of the skull.

As the cranium is attached to the spine, considerably behind the axis of the head, a vacuity is left between the front of the vertebræ and the inner surface of the lower jaw-bone. In a fully grown adult, the base of whose skull is placed parallel to the horizon, the surface of the teeth in the upper jaw bone is generally not much either above or below the line of the foramen magnum. By this position, and by the concavity of the roof of the mouth, a sufficient space is left between the spine and the lower jaw to give lodgement and protection to the tongue, also to some of the large vessels, nerves, and important glands. Between the mastoid process of the temporal

bone, and the ascending plate of the maxilla inferior, there is only the transverse diameter of the external auditory sinus interposed. In a well-formed jaw the ascending plate is about two inches in length, and the angle of the jaw is situated about an inch anterior to the cervical vertebræ. A little before the root of the mastoid process, and a little nearer to the centre of the base of the skull, the styloid process begins. From the inclination forward of the styloid process its distal extremity comes to be hid behind the ascending plate of the jaw-bone, although its root be placed considerably behind it. This is a character peculiar to the adult; it is one which neither exists in childhood, nor is to be found in an edentulous subject.

When the base of the skull is placed parallel to the horizon, and when the muscles about the throat are in an easy state of relaxation, the pharynx is flattened, and the back part of the larynx rests on its posterior surface, which is in close contact with the face of the spine. In this position of the head the os-hyoides is nearly as high as the margin of the lower jaw-bone. Hence the posterior belly of the digastric muscle has only a slight declination, while the anterior runs almost in a straight line forward.

In tracing the relation of the parts about the angle of the jaw, the preferable plan, I believe,

will be to begin behind, and notice them in succession forward.

The spinal accessory nerve appears between the transverse process of the atlas and the internal jugular vein. It lies in such a situation that it may be exposed by an incision made along the anterior margin of the sterno-mastoid muscle, just opposite to the transverse process of the atlas. Lower than this the nerve is completely covered by the muscle, which it finally perforates to reach the trapezius muscle. Nearer to the angle of the jaw than the spinal accessory nerve, but in contact with it, the jugular vein is found; next to it, we see the lingual nerve, and then the internal carotid artery. The external carotid is separated from the internal, which is the deepest seated, by the styloid process; or, where that process is very short, by the ligament which is extended from it to the appendix of the os-hyoides.

A little lower than the angle of the jaw the occipital artery generally arises from the external carotid. The occipital artery in its course slants upward and outward, traversing the internal carotid, the nervus vagus, the lingual nerve, and the internal jugular vein; after which it slips in behind the digastric muscle, and passes round the root of the mastoid process, just above the transverse process of the atlas. From between the internal carotid and jugular vein, but

a little lower than the line of the lower jaw, the lingual nerve makes its appearance. It instantly turns rather abruptly forward, and in doing this, it often hooks round the origin of the occipital artery. Just where accomplishing this turn, it sends off the ramus descendens noni, after which it continues forward, passing, in its course, behind the termination of the fascial vein, but before the external carotid artery. A little nearer to the os-hyoides it slips behind the digastricus and the stylo hyoideus, lying between them and the stylo-glossus muscle.

The lingual nerve is in absolute contact with the root of the lingual artery, but when they have reached the side of the tongue they are separated by the interposition of the hyo-glossus muscle, which continues between them forward to the origin of that muscle from the body of the os-hyoides.

Till the artery arrives at the junction of the body with the horn of the hyoid bone, it is covered by the skin, by the fibres of the platysma myoides, the cervical fascia, the lingual nerve, and the hyo-glossus muscle. When it turns forward and plunges deep into the substance of the tongue, and begins to be broken down into branches, it is covered by new parts. When we now cut to it from below the chin, we require to divide the skin, platysma myoides, fascia, the anterior belly of the digastric, the mylo-hyoideus,

and the genio-hyoideus. By an incision through these, the artery will be brought into view, lying between the genio-glossus and the lingualis muscle.

This view of the locality of the lingual artery puts it beyond a doubt, that the proper place to expose the vessel, when we wish to pass a ligature round it, is while it is running parallel to the horn of the os-hyoides. There, it is comparatively superficial, and consequently easily reached; it is neither entangled among many muscles, nor connected with more than one large nerve. It is rare, however, that this operation requires to be performed; yet, when we recollect that many patients have been allowed to die a lingering death, when the tongue has been diseased, purely from the dread of the bleeding which would arise from extirpation of this organ, it becomes necessary to show the command which the surgeon actually has over the lingual arteries. The older operators imagined that it would be necessary to tie the vessels just where they were divided; but the known difficulty of accomplishing this in a deep and confined cavity, naturally made them timid.

Mr. Everard Home and others have proved, that portions of the tongue may, with the greatest safety, be removed by ligature. Yet there are cases, in which, from the situation of the diseased parts, it would be impracticable to apply

the thread. In such cases, I hardly think it too much, when I say, that the morbid parts may be extirpated by the knife. Have not we seen, that by a superficial and safe incision, the trunks of the lingual arteries may be tied before they have given off any important branches. Now, I would inquire, if this has been done, what have we to dread? not the bleeding surely, for that we have controlled; not the loss of the tongue, for that organ, we without hesitation, remove with the ligature; and we know, that by disease, the whole of it may be destroyed without much detriment.*

When I thus argue the practicability of extirpating the tongue with the knife, I should be sorry to be misunderstood, or to have it supposed, that I would, when the ligature could be employed, prefer the scalpel. On the contrary, I have used the ligature in removing a considerable portion of the tongue, and would still continue to employ it whenever I could apply it. But every surgeon may have seen cases, where from the situation of the disease, he could not use a ligature. I have myself seen three, under the care of other surgeons, who, after the application of many and various remedies, local as well as general, had the mortification to see their patients daily sinking under the extension of the disease, which began at the root of the

* Riolan and Portal.

tongue and proceeded forward. In such cases, at least, I would, after having tied the trunks of the lingual arteries, be inclined to try the effect of extirpating the morbid parts with the knife.

It is not the relations of the trunk of the lingual artery alone which the student ought to make himself acquainted with. He will do well to study the position of the arteria ranina in respect to the frœnum linguæ. This information will teach him the impropriety of pointing the scissors upward and backward, when snipping the frœnum, an operation, oftener performed than needed. He will learn that the ranular artery lies just above the attachment of the frœnum, so that if he would avoid it, he must turn the points of the scissors rather downward; if he do not, the artery will probably suffer. As the consequences of injuring this vessel, and the plan of treatment are very fully related in different works, I refer to them.

As the os-hyoides is nearly as high in the throat as the jaw-bone, when the base of the cranium is placed parallel to the horizon, the mylo-hyoideus muscle has very little descent. When, therefore, the submaxillary gland is cut away, a considerable cavity is left between the side of the tongue and the lower jaw-bone. The roof of this hollow is formed toward the chin by the mylo-hyoideus, and nearer to the angle of the jaw by the hyo-

glossus, which is intersected by the stylo-glossus. Between the carotid arteries and this cavity, the ligament of the angle of the jaw is interposed. Above the hyo-glossus muscle, the lingual branch of the third division of the fifth pair of nerves runs towards the tongue.

In this cavity, the submaxillary conglomerate and conglobate glands are lodged, along with the facial artery and vein, together with the branches sent off from them before they mount on the face. In this position of the head, little of the submaxillary gland is exposed, it is almost entirely covered by the body of the jaw bone. It is all, indeed, nitched in between the two bellies of the digastric muscle and the jaw bone. The facial artery at its origin is very little lower than the angle of the jaw, hence, it soon becomes closely connected with the submaxillary gland; but before it does so, it gives off the ascending palatine and the tonsillitic branches. It then mounts over the submaxillary gland, lying in a sulcus, formed for its reception. The facial vein descends along the side of the gland nearest to the ear, and empties itself generally into the internal jugular vein, just below the edge of the digastric muscle.

Behind this cavity, deep-seated, and nearly opposite to the root of the alveolar process of the second molar tooth, the tonsil lies sunk into the recess formed between the pillars of the fauces. It is situated in the angle between the

stylo-glossus and stylo-pharyngeus, and is covered by the fibres of the palato-pharyngeus muscle. It is supplied by an artery arising sometimes from the lingual, but generally from the labial artery, just where that vessel is passing along the insertion of the stylo-glossus muscle. The tonsillitic artery is therefore short, and it is also generally small, but where the tonsil was diseased, I have seen its nutrient vessel larger considerably than a crow quill.

A little higher than the origin of the labial artery, the external carotid is nearly opposite to the tonsil, but the internal lies a little behind the natural situation of that gland. The glosso-pharyngeal nerve which escapes from between the external and internal carotid arteries, just at the origin of the stylo-pharyngeus muscle, is, as well as that muscle and the stylo-glossus, completely sunk behind the jaw bone.

These are the relations which the different parts bear to each other, and to the jaw bone in the full grown adult, in whom the head is neither inclined backward nor forward. By bending back the head, the position of all the parts becomes materially altered; but none are more changed than the submaxillary gland, the facial artery and vein. These parts, which in the natural position of the head, lie retired behind the body of the jaw bone, are much exposed by the elevation of the chin. The cavity which formerly existed be-

tween the maxilla and the mylo-hyoideus, is much reduced in size, and its contents are brought out from behind the jaw bone. They are rendered more accessible where we wish to extirpate them. These changes ought to be remembered, when about to remove a tumour from this region, because the operation will be materially facilitated by placing the head in a proper position. The frequency of such tumours will be readily estimated by one who knows the number of conglobate glands which are clustered round the submaxillary salivary gland, and who remembers how liable these are to contamination from sores in the neighbourhood.

The salivary glands are very rarely swelled, the lymphatic ones very frequently, but it fortunately happens, that these glandular swellings are not often of such a nature as to require excision. They are usually scrophulous, running their course slowly, but at length suppurating. Sometimes, however, the tumour is of a less tractable nature; for sometimes it arises from absorption of specific pus, from ulceration of the lip, or of the cheek, or below the tongue.

A tumour of this species, may, in the early stage of the complaint, be removed with tolerable ease; but where it has been neglected from the compression and matting of the parts in the vicinity, the excision is attended with greater difficulty and more danger. Extirpation of the

tumour is only, indeed, practicable, when the morbid mass is defined and moveable.

If it has become fixed, it will, by the resistance of the fascia and platysma myoides, be prevented from extending downward; it will become pushed upwards, forcing its way into the mouth from below the tongue. Here, however, I would caution the surgeon not to mistake the fulness naturally produced by the sublingual gland for a tumour; a fulness which is much increased when the submaxillary glands are enlarged. The granulated surface, and doughy feel of the salivary gland, may assist him in distinguishing it from a part of the diseased mass, which generally pushes the sublingual gland towards the tongue, making thus a way for itself into the mouth, between the displaced sublingual gland and the gum. Thus, a tumour, which superficially has only a small appearance, may have formed deep-seated connexions, which would forbid any attempt to operate.

Such a tumour will be in contact on the side nearest to the chin with the digastric muscle; above it will touch the mylo-hyoideus, and behind that muscle, it will be absolutely in contact with the lingual branch of the fifth pair of nerves, which is interposed between it and the sublingual gland; and posteriorly, it will be more or less connected with the primary branches of the carotid artery, and with the side of the pha-

rynx. Even in the simplest tumour, the morbid parts are closely connected with the labial artery and vein, for these vessels are generally more or less buried in the diseased substance; and in planning our operation, we must decide on sacrificing them. But when the tumour has extended so far as to have come in contact with, and become fixed to the other parts which have been mentioned, the difficulty of dissecting away all the diseased substance, will be insuperable.

Mrs. M'Donald's was a very deplorable case of disease in the salivary and conglobate glands below the jaw. From ear to ear, her throat was girded by a chain of tumours, some interwoven with the muscles and vessels, and others wedged into the fauces, but all so clustered, so much matted among the surrounding parts, and so widely connected, as to defy any operation. When I first saw her, she was gasping for breath, and the anxiety and leaden hue of the countenance bespoke the severity of the struggles for air, and its great deficiency.

Nothing relieved her but the occasional bursting of small kernel-like cysts, which pervaded the more solid texture, and which discharged trifling quantities of glutinous fluid into the mouth streaked with blood. Blisters, and the other remedies employed, had no effect; an operation was out of the question; earnestly, therefore, as we desired to alleviate her sufferings,

we could do no more, than at each visit witness her distress, and regret the impotence of our art.

In deciding on the expediency of extirpating a tumour from below the jaw, we may be considerably assisted by ascertaining the origin of the disease, discovering whether it be idiopathic, or dependent on absorption from some sore in the vicinity, the length of time the swelling has continued, and the rapidity of its growth. If it has been produced by absorption from a specific sore, if it has been of short continuance and slow in its actions, and if it still continues as moveable as could be expected, considering the effect of the fascia, we may undertake its removal. But if, on the other hand, it has dated its origin from a distant period, has been brisk in its actions, and has become fixed to the muscles, vessels, and nerves in the neighbourhood, it would be foolish to attempt its extirpation. Because, although from the resistance of the fascia, the tumour externally may not appear formidable, yet, internally it may have extended its connexions, and embraced parts from which it could not possibly be cleared. To attempt, therefore, its removal under such circumstances, would be fruitless; we might, indeed, cut away what we saw of the diseased substance, but a portion would still remain behind.

Before resolving on the extirpation of a cancerous lip, the surgeon ought most carefully to examine the state of the submaxillary absorbent glands. This he ought to do in every case; but where the disease is in an advanced stage, and seated in the lower lip, he ought to be doubly watchful. From inattention to this point, I have more than once seen the disease, after the extirpation of a cancerous lip, reproduced below the jaw; a gland which had been contaminated there was overlooked, it continued to increase in size, and, before the death of one of the patients, which was occasioned by a different complaint, the tumour had acquired such a size as to give rise to considerable inconvenience.

When a tumour is to be extirpated below the jaw, the operator will most easily accomplish his purpose, by placing the patient on a chair, and reclining his head on the breast of an assistant, who ought to stand behind him. The jaw of the patient must be kept closed, while the surgeon by a crucial incision through the skin, platysma myoides, and fascia, exposes the tumour, which he is fully to uncover, by dissecting the flaps to a side. Next he is to push his fingers between the swelling and the surrounding parts, working his way among the cellular membrane, till, at the lower end of the tumour, he feels the pulsation of the labial artery. By insinuating the finger along the tumour, following the course of the vessel, he

will ascertain its connexions. If he find that the artery is not imbedded in the substance of the swelling, he may, by continued working with the fingers, insulate and remove the tumour, without injuring the trunk of the labial artery. Generally, however, he will find the vessel so closely connected with the morbid mass, that it would be out of the question to attempt their separation. Here the plan to be pursued is evident. A ligature is to be passed round the labial artery, just where entering into, and passing out from the diseased gland, and next the vessel is to be divided at both places, nearer to the gland than where the threads have been applied.

On the dead subject I have found it easiest to detach the gland when I began its separation nearest to the angle of the jaw, and proceeded towards the chin, near to which the submental artery will require to be snipped across. It is demonstrable, that in this way the submaxillary conglomerate gland will be torn away along with the tumour; but this, so far from proving disadvantageous, will add to the security of the patient. But let the surgeon remember, that in many subjects the submaxillary and sublingual glands are connected by a communicating slip, which will require to be cut across, else the sublingual gland will be pulled away, which, to say the least, would be generally unnecessary.

The salivary glands, although not so often dis-

eased as the lymphatic glands which are clustered around them, are nevertheless, somtimes affected. For instance, they are subject to inflammation, producing a painful swelling below the tongue, accompanied with interruption of the secretions of that part of the gland which is inflamed. Resolution or induration are the usual terminations of this inflammation. Gariot, a late French author on the diseases of the mouth, conjectures that the secreting part of a gland is incapable of suppurating; when, therefore, an inflamed gland suppurates, he asserts, that the purulent matter is formed by the cellular texture entering into the composition of the gland. This, if correct, is an important fact, because, as the cellular matter is the medium through which the blood-vessels are conducted into the glandular substance, it follows, that if the former be destroyed, the latter also must decay, and then the whole or a part of the gland must die according as the suppuration has been general or partial.

The salivary glands are not only liable to become inflamed, but calculi likewise form in them. When a concretion has formed in the sublingual gland, a chronic, irregular, and dense tumour is produced below the tongue. The disease is readily discovered and easily cured. The foreign substance is to be extracted by an incision into the gland, just by the side of the frœnum linguæ.

A calculus, weighing a drachm, was in this way easily extracted.

The hard tumour occasioned by a concretion gives rise to a considerable inconvenience; but obstruction of the termination of the sublingual duct is a more dangerous, because a more insidious complaint. Its commencement is marked by a small and painful papilla beneath the tongue, which slowly enlarges, till it finally presses the tongue firmly against the roof of the mouth, injuring the speech, and impairing the functions of respiration and deglutition. At length the most prominent point of the tumour bursts, and discharges a considerable quantity of a transparent glary fluid. By the evacuation of the fluid, the tongue recovers its natural position, every inconvenience is suddenly removed, and the patient flatters himself with the delusive hope that he will soon be cured. Sometimes, however, the complaint assumes a more alarming appearance.

Ehrlich in the observations collected during his travels, relates a curious case of this disease: "Un jour un homme demanda à parler à M. Cline. On le fit entrer dans l'antichambre: tout a coup M. Cline, entendit tomber quelque chose, et des plaintes et gemissemens d'une personne. En ouvrant la port il vit l'homme en question, etendu par terre, sans connoissance et pret à étouffer. Cline soupçonna la presence d'une corps étranger dans la trachée artère, et se disposoit

deja à pratiquer la bronchotomie, lorsqu'il apperçut la langue du malade poussee fortement en arriere par une grenouillette qui de plus faisoit saillie au dehors. Il y plongea une lancette, et donne par la issue à une grande quantité de pus et de lymphe.

"Le malade, revenu à lui, declara que depuis long-tems il avoit porté une tumeur considerable sous la langue, sans en etre géné ni en parlant ni en respirant; que cette tumeur, pendant le peu de minutes qu'il avoit attendu dans l'antichambre, avoit acquis tres subitement un acroissement si considerable qu'elle l'auroit infailliblement étouffé sans la prompt secours que M. Cline lui avoit donné."

This was a peculiar case, generally the progress of the tumour is slow, and it bursts before such a size as in the present instance has been acquired. The opening seldom, however, continues pervious for more than a few days; it slowly closes, again a tumour forms, it enlarges, bursts, but effuses a smaller quantity of fluid than the former one, and the tongue returns less perfectly to its situation than before. The sides of the sac, have now begun to thicken, and the parts in the vicinity have begun to swell. The original complexion of the disease is about to change, yet the alteration is not suddenly accomplished. The collection and evacuation of fluid is continued for a length of time; but after each successive discharge the patient is less and less

relieved, till at length the tumour becomes altogether solid. Now it increases more rapidly, and now it more completely displaces the tongue. Formerly this organ had only been pressed against the roof of the mouth; now its apex is reverted, so that it presses on the epiglottis, disturbing breathing and swallowing very materially, and about this time the tumour begins to project below the jaw.

The nature of the tumour is most thoroughly changed; from containing a fluid, it has become solid, it is daily enlarging, and we can now anticipate no spontaneous alleviation of the disease, such as took place in the former period. This is a disease, which in the early stage, is easily cut short, but when permitted to gain ground, its treatment becomes more complicated; and after the tumour becomes solid, it baffles every attempt at cure. This ought to be firmly impressed on the mind, for here it is the duty of the surgeon, to decide early on the plan he is to follow, and having once resolved, it is his business to act up to his intentions with promptitude.

Before the sides of the cyst have begun to thicken, the treatment is exceedingly simple. The sac is to be treated as a sinus; we are to plunge a bistoury into it behind; are to open it through its whole extent; are to irritate its inner surface, to produce re-union of its sides, and the destruction of its glandular function. The natu-

ral bursting of the sac, or the mere puncture, are only palliative. Before we can cure the complaint, the callous inner surface of the cyst must be fairly exposed, and brought into a granulating state, by the use of stimulating applications, such as tincture of myrrh, or diluted aq. potass. The sore must be healed from the bottom, otherwise we merely teaze the patient, and convert a curable into an incurable complaint. Generally so soon as the sides of the sac have begun to form granulations, the further use of irritating applications is to be given up; they are now detrimental, in so far as they tend to check the formation of healthy granulations.

Where the surgeon has been consulted sufficiently early, the preceding plan of treatment will generally prove effectual, but where the disease has advanced so far, as to have induced a considerable degree of induration about the termination of the sublingual duct, then the plan advised by Gariot must be adopted. He directs that the tumour be completely opened by a crucial incision, after which the callous sides of the cyst are to be cut off with a bistoury. The sponge will control the bleeding. In a few days suppuration commences, granulation soon follows, and the wound heals up progressively.*

Paré and Tulpius, after opening the cyst, applied a heated iron to its inner surface. Dionis

* Gariot Traite des Maladies de la Bouche, p. 131.

touched it with sulphuric acid, in place of which M. de la Faye employed the caustic. Wilmer in one instance, passed a seton through the tumour which not inducing sufficient irritation, was withdrawn. He then removed with the knife, a circular portion of the cyst, below the tongue and next used the caustic, by which a radical cure was accomplished.*

In another case of ranula, where the tumour was very large, and projected far below the circle of the jaw, he made an incision into the cyst from below the chin, removed the lower part of the sac, stuffed the wound with dry lint, which he removed on the fifth day, and applied the pure potassa to what remained of the sac. In a few days the slough separated, and in six weeks the patient was cured.† I mention this case, not on account of any peculiarity in the principle of treatment, but on account of the place where the incision was made into the sac. Where the sublingual gland is affected, the tumour is prevented by the mylo-hyoideus from descending toward the throat, and pushes itself into the mouth: where the submaxillary gland is the seat of the disease, that muscle prevents the tumour mounting into the mouth; it swells below the chin. In the first case, therefore, we would cut into the cyst, just below the tongue, but in the last, we

* Wilmer's Cases in Surgery, p. 80. † Ibid, p. 78.

would prefer Wilmer's plan of cutting below the chin.

In a very large ranula, of so long continuance as to displace the teeth, the tumour was extirpated at a time when the risk of suffocation was imminent. The cure was not completed, on account of tedious exfoliations from the jaw bone, and the growth of fungi, till three months after the operation.*

When mentioning the relation of the parts near to the angle of the jaw, it was stated that the tonsil lay almost opposite to the root of the alveolar process of the second molar tooth—deep-seated—crossed by some of the branches of the carotid, and pretty near to the external carotid artery itself. As this is a secreting organ, intended to form a fluid to assist in lubricating the parts when swallowing the food, it is freely supplied with blood; but by this very mechanism it is subjected to disease; it is liable to inflammation; it swells, and as it enlarges, it encroaches on the passage by which the air is admitted into the larynx, whereby the breathing is obstructed, and the deglutition impaired. From the mechanical effect of the tumour on these functions, we would wish as speedily as possible to procure its removal; we would therefore, vigorously use the means commonly employed to obtain resolution, and where these failed to produce the desired effect, we would without temporizing,

* Memoires de l'Acad. de Chirurg. tom. iii.

endeavour to conduct the disease to suppuration. The abscess generally bursts between the pillars of the fauces, but Dr. Brown has informed me, that in two patients, it burst through the velum pendulum palati. In both of these cases the sore formed very much resembled a venereal ulcer, and without great care in tracing the origin and progress of the disease, would have been mistaken for a venereal affection.

I may also mention, that where the chief prominence in abscess of the tonsil is seen, not between the pillars of the fauces, but on the forepart of the velum, it is not to be expected that the tumour will point as in external suppurations. On the contrary, the pus will continue long deep-seated, and were the surgeon to delay making an opening, in the expectation that it would become more superficial, the patient before this event took place, would die from suffocation. So soon, therefore, as the difficulty of breathing renders it necessary, an opening is to be made into the abscess, and that even where the matter is still deep-seated; but fluctuation, generally obscure indeed, must be felt, before we presume to thrust an instrument into the tumour. If this point be not fully ascertained, a polypus may be mistaken for an abscess of the tonsil. A case in which a mistake of this kind had been committed, came under the observation of Mr. John Bell, who has very properly described it in his late work on tumours.

When we have resolved on opening an abscess in the tonsil, some caution is required; it is to be remembered, that this gland naturally, is very near to the carotid artery, and that by enlargement, it is brought still more closely in connexion with it. Hence this vessel may, by passing the cutting instrument too deep, and inclining it too much toward the angle of the jaw, be injured. In this country, I have been informed, that a surgeon in opening a tonsillitic abscess, actually did plunge the knife into the carotid. I need hardly add, that he lost his patient before he could suppress the bleeding. In Portal's work, a case may also be read, where in opening an abscess in the tonsil with a pharyngotome, "un *habile chirurgien* de Montpelier eut le malheur d'ouvrir une grosse artère et de voir perir un malade d'une hæmorrhagée si voilente, qu'on ne put jamais parvenir à l'arreter."

On these cases, I would only remark, that they betray rashness and ignorance of the structure of the parts about the angle of the jaw; they prove most incontrovertibly, that the operators were deficient in a knowledge of the relations of the tonsil. One who is familiar with the parts in connexion with the tonsil, will, in entering the knife into an abscess here, take care not to direct its point in the line of the angle of the jaw, for he is well aware that if he do this, he may injure a large artery. He will push the instrument into

the front of the tumour, and carry it directly backward, as if he intended to cut off a segment of it; if he follow this course, and transfix the abscess, the worst which can happen, will be injury of the back part of the pharynx; a trivial accident when compared with that of opening a large blood vessel.

Where the collection of matter is large before the abscess burst, the patient is in a more dangerous situation than is generally imagined. His breathing is obstructed and gasping, he feels much anxiety in the chest, his face is dark and bloated, his eyes are painted with vessels containing purple-coloured blood, they are prominent, and seem ready to start from their sockets; we cannot be deceived in regard to the origin of these symptoms, which decidedly show, that the lungs are imperfectly supplied with pure air. Whenever the abscess bursts, the mouth and fauces are filled by a gush of matter, every obstruction to the free entrance of the air is suddenly removed, the patient fetches an involuntary and deep inspiration, air and matter rush together into the trachea, and death from suffocation, is almost the inevitable consequence.

This to some, may have the appearance of a fanciful description, or at all events, an overcharged picture; but its fidelity will be admitted, when I inform them, that in this very way, a strong active young man lately lost his life. He

had been complaining for a few days of a sore throat, for which he had consulted his surgeon, who had employed the usual remedies. The inflammation terminated in suppuration; the abscess enlarged, till at length the tumour occupied almost entirely the fauces; yet ten minutes before his death, he was walking about the house, restless indeed, anxious, and gasping for breath. The bursting of the abscess and death followed each other so rapidly, that no measures could be taken to prevent the latter event.

The cause of death was not conjectured in this instance, the body was examined, and the trachea found deluged with purulent matter.

To prevent a similar accident, it would be advisable, where the tumour is large, and the difficulty of breathing great, to puncture the abscess as we would do a hydrocele. Were the matter evacuated through a canula, there would be no risk of its finding a way into the windpipe, and if the stilet were made to project only a little beyond the canula, the trocar may be as safely used as any other instrument.

In some patients, after repeated suppuration, but in others without any obvious cause, the tonsils become enlarged and indurated, occasioning serious inconvenience both in breathing and swallowing. Sometimes the tumour slowly decreases in size by occasional detraction of blood, followed by the repeated application of small blisters just

below the angle of the jaw, conjoined with the daily internal use of some purgative salt. One drachm of the sulphate of magnesia, dissolved in eight or ten ounces of water, will keep the bowels easy, which is all that is required. Where the tonsil still continues swelled, notwithstanding the use of these remedies, benefit may be derived from passing electric sparks through the tumour.

Where the tumour, in place of decreasing in size, continues to enlarge, we must, on account of the effect produced on respiration and deglutition, remove the diseased substance. It is not, however, generally necessary to extirpate the whole tonsil, nor, in fact, is that an operation which, even if required, could be safely accomplished. It is fortunate therefore, that in the diseased state of the tonsil, which renders its removal necessary, if a part of the tumour be extirpated, what remains skins over, and gives no further inconvenience.

In taking away a portion of the tonsil, different plans have been employed. Bertrandi was in the habit of cutting away a portion of the gland with perfect safety. Gariot also prefers the bistoury or sheathed cystome for this purpose, and he recommends it as both the surest and most expeditious mode of operating.* We have the testimony of these and other authors to prove, that the hæmorrhage is seldom profuse after the

* Gariot des Maladies de la Bouche, p. 99.

excision of a part of the tonsil. The bleeding will generally be checked by gargling the throat with cold water, or by touching the orifices of the vessels with a camel's-hair pencil, dipped in oil of turpentine or alcohol, and where these fail, it may be certainly counteracted by the application of a hot wire. In using the latter, we must use the precaution of conveying the heated wire along a canula, otherwise it would be liable to come in contact with parts which we would not wish it to touch.

Sometimes after the prominent part of a diseased tonsil has been cut off, the wound does not heal readily; the cure is retarded by a soft lymphatic looking fungus, which shoots up from the surface of the sore. Before recovery will take place, this excrescence must be destroyed. This has been accomplished, by touching it twice or thrice a-day with the muriate of ammonia, finely powdered; but on the whole, the actual cautery is, perhaps, preferable to any other plan.

Some surgeons are afraid to use the knife, and some patients dread the pain of cutting; such may employ the double ligature proposed by Cheselden. A curved needle, armed with a double ligature, composed either of very flexible wire or waxed thread, is to be passed through the tonsil, as near to its junction with the sound parts as possible, by which the swelling is divided

into two equilateral portions. Then separate the threads, and run the two belonging to the upper segment of the tumour through a polypus canula, next push the latter home against the root of the morbid mass, and retain it there by twisting the ends of the ligature round the bars of the canula. Treat the under half of the tumour precisely in the same manner, and tighten the threads daily, till the intercepted parts drop off. This operation which seems to be very simple and easily planned, is nevertheless, difficult in execution; the tumour on which we are to operate is large; the cavity in which we are to act is confined. I would never, therefore, employ the ligature, until foiled in removing the tumour by other means, and until the patient decidedly objected to the use of the knife.*

It is not to be inferred that every chronic enlargement of the tonsil depends on thickening and induration of the substance of the gland; it is sometimes produced by the formation of calculi. These seldom in the amygdalæ acquire any considerable size, but their presence is productive of irritation, and repeated attacks of cynanche; the inflammation generally proceeding to suppuration. After each successive discharge of matter, a solid and circumscribed tumour remains in the situation of the tonsil, where, sometimes by a probe, the calculus may be detected. It is

* See Appendix (D.)

evident, that a surgeon who is not aware that calculi may be formed in this gland, will be liable to consider the tumour as dependent on some more serious affection. I have never had an opportunity of examining a patient with a calculus in the tonsil, but I have received the history of three cases of this disease, all occurring in the same family, and known to Mr. Robert Wilson, an intelligent practitioner in Beith, who sent me the calculi.

The first case was that of Agnes Wark, who soon after exposure to cold and wet feet, complained of a fulness about the fauces, accompanied with pain, which extended along the Eustachian tube of the left side. Her respiration was obstructed, and her deglutition difficult. After three weeks, the tumour suppurated and burst externally. The sore discharged purulent matter for a fortnight, when it healed. Two months afterward, from a similar cause, the throat became again inflamed, suppurated, burst, and healed. Indeed, during eighteen months, she had frequent attacks of cynanche tonsillaris, all of which uniformly terminated in suppuration, and all of the abscesses burst externally.

It was not, however, till about this time, that she discovered after the sore had healed, a regular and solid tumour on the left side, which protruded the skin, just below the angle of the jaw. Soon afterward, and without any obvious cause,

she had a very severe and long continued attack of inflammation in her left tonsil. An abscess formed and burst externally, discharging matter during a full year, by eight small appertures.

Before this time she had never consulted any medical practitioner, but she was now induced, from the long duration of the disease, and the inconvenience resulting from the pain and discharge, to show the ulcerated part to a surgeon, who discovered by probing the sore, that a calculus was lodged in the tonsil. Having ascertained this point, he next endeavoured by an external incision, to extract the concretion; but the bleeding deterred him from enlarging the wound to a sufficient extent, so that his operation ended in detaching a fragment from the body of the calculus. Being foiled in this attempt, he next advised the application of a cataplasm over the wound, and directed the patient to wash the throat frequently during the day with some simple gargle. By this treatment, little alteration was apparently produced; but in the course of fourteen days, the calculus dropped from the tonsil into the mouth. From this time the sores began to heal, the discharge lessened, the pain abated, and after the cure, which was completed in a few weeks, she had no return of cynanche during a period of twelve years.

The brother of this woman was similarly affected, but in him the disease continued during

twenty years before the calculus was discharged from the tonsil. In the third patient, who was nearly related to the two former ones, the concretion dropped into the mouth, about two years after the commencement of the complaint in the tonsil.

In these patients considerable inconvenience was occasioned by the encroachment of the tonsil on the fauces, an inconvenience which was rather increased than diminished by suppuration, and which was constantly on the increase. Considering this, a surgeon who satisfied himself with a cursory examination of the patient, might have imagined the enlargement depended on thickening of the substance of the gland itself, and on that supposition he might have begun an operation, which would have terminated in his own discomfiture.

In the first case, I would likewise notice an impropriety committed by the surgeon, who believed that by enlarging the external sore he would have it in his power to extract the stone. Here it is evident, that he forgot that the concretion was deep-seated, that it was by sinous passages that he brought the probe to grate against it, and above all, that it lay imbedded amongst large vessels, which must have been divided, before a wound could be made of sufficient size to permit of the extraction of the calculus. On these accounts an external incision is com-

pletely out of the question, so long as the concretion continues deep-seated; it is only allowable when the calculus has, by suppuration and ulceration, worked its way outward, so that it is only detained by the skin. Here, any other than an external incision would be preposterous; but there can be no doubt regarding the propriety of an internal cut into the substance of the tonsil, in order to extract the foreign substance, so soon as its existence has been ascertained.

These, and indeed all tonsilitic concretions, have been distinguished by a fetid stercoraceous odour.

Sometimes the concretion does not acquire the same degree of solidity as in the preceding cases. In some patients it forms in the cryptæ of the tonsil, enlarging them, and even projecting into the fauces. Where it assumes that form, it can, by any blunt pointed instrument, be turned out from the recesses of the tonsil, in gritty masses of a dirty white colour.

The formation of this gritty matter, would seem to be connected with a deranged state of the intestinal canal. It will be necessary to pick the foreign substance from the tonsil, and to prevent its reproduction, the bowels must be restored to their natural action. It is by no means an uncommon affection.

So soon as the external carotid artery has emerged from behind the stylo-hyoideus and the

digastric muscles, and while it is lying over the internal carotid, it attaches itself to the parotid gland, with which, for the remainder of its course, it continues to be very intimately connected, and in the substance of which it sends off its branches. This gland and its connexions are too important to be passed over with a cursory notice; its situation and extent ought to be known to every student; it is not the circumscribed and well defined gland which many believe it to be, neither is it confined to the space between the ascending plate of the lower jaw-bone and the ear. That is really a small part of the gland, the limits of which cannot be shown by a superficial dissection, which can give no just idea of either the extent or connexions of the parotid gland. To unfold these, we must penetrate deeper, we must follow the gland to the very root of the external auditory sinus, almost to the internal carotid artery and jugular vein; we must trace it sunk behind the plate of the jaw-bone, and see it adhering there to the internal pterygoid muscle; we next follow it behind the sterno-mastoid muscle, and down along the neck a little way below the angle of the jaw, and examine it where folded over the posterior edge of the masseter muscle, and when we have done all this, we shall only have made ourselves acquainted with the mere locality of the gland. We shall have still to learn that it is,

while buried in the deepest part of the parotid gland, that the external carotid artery gives off the arteria posterior auris, and divides into the internal maxillary and temporal arteries, and likewise that it is while imbedded in this gland that the portio dura crosses the artery.

The parotid gland is then sunk so deep, and is so firmly locked in between the ascending plate of the lower jaw-bone and the mastoid process, that when it becomes diseased the patient cannot open his mouth, and from the effect of the fascia the tumour is flat. Its extirpation is quite out of the question; its impracticability is proved by reviewing the connexions of the gland. Whoever has, in situ, injected the salivary duct with mercury, and then, even where the gland was healthy, where it was free from preternatural adhesions, and limited to its natural size, has tried to cut it out, would be convinced, when he saw the mercury running from innumerable pores, that the gland extends into recesses into which he could not trace it in the living body. If this be true in health, what must it be in disease, where the parts are wedged between the angle of the jaw and the mastoid process, and nitched into every interstice around. On the dead subject I have attempted the extirpation of such tumours, but even there have never succeeded in clearing away fully the diseased substance.

The inference from this fact is too plain to require to be expressed. Those who assert that they have extirpated the parotid gland, have, I am fully convinced, mistaken that little conglobate gland which lies imbedded in its substance, and which does sometimes enlarge, producing a tumour in many respects resembling a diseased parotid, for the parotid itself. I have seen an enlargement of the lymphatic glands taken for a diseased parotid, and the same has occurred to Mr. Cruickshank. This author, when speaking of the absorbents and glands about the parotid, adds, that he had known these "indurated and enlarged to the size of a hen's egg, which gave suspicion of a cancerous affection in the parotid itself."*

This gland, in the early stage of the complaint, may be extirpated, but the parotid cannot. "The cutting out completely the parotid gland is a thing quite impossible, since the greatest of all the arteries, viz. the temporal and the maxillary, lie absolutely imbedded in the gland."†

If we may credit the assertion of Mr. Charles Bell, we must believe that his brother, assisted by himself, actually accomplished this impossibility: "I assisted my brother formerly in this operation. The whole gland was diseased; it

* Cruickshank's Anatomy of Absorbent Vessels, second edition, page 203.

† Bell's Anatomy, vol. 2d, page 293.

was dissected all round, until it remained attached only at that deep point which is behind the angle of the jaw, where it encircles the artery. A ligature was put upon its root, and in a few days it dropped off, more completely eradicated than could have been possible with the knife."* Nor does this assertion of Mr. Charles Bell's rest on his authority alone. Mr. John Bell avows the operation which he would wish to make us believe he had often performed, "for I had often extirpated the diseased parotid."† With his own words he shall condemn himself: "What shall we think, then, of those surgeons who talk in such familiar terms of cutting out the parotid gland."‡

Did Mr. Bell know the connexions of this gland less perfectly when he wrote his System of Anatomy than afterward? Did this lately acquired knowledge teach him that his former inference was incorrect? Did it convince him that the parotid gland may really be extirpated? Did he from this belief actually undertake and accomplish its excision with the assistance of his brother? Let Mr. C. Bell determine the motives which induced him to "talk in such familiar terms of cutting out the parotid gland;" and let Mr. John Bell assign some more satisfactory reason for

* Bell's Dissections, third edition, p. 249.

† Bell on Tumours, p. 210.

‡ Bell's Anatomy, vol. 2d, p. 293.

declining the extirpation of this gland than its connexions with the temporal and maxillary arteries, for these might both be controlled. The arteries are not our dread; they do not deter us from performing this operation; but the nitching of the gland into interstices from which we cannot extricate it, leave us no hope of clearing away all the diseased substance, without which any operation would prove abortive. This is our chief consideration, and this insurmountable obstacle, our only objection.

I have endeavoured to place the question regarding the extirpation of the parotid gland in its proper light, and to show from the anatomy of its connexions, that it is an operation, which, in no situation, and under no circumstances, ought to be undertaken. If the disease be really seated in the parotid itself, which, in nine cases out of ten, it will not be, we could have no expectation of extirpating every particle of the tainted substance. This must decide the question. But how are the operations to be explained, in which this gland was reported to have been cut out? This will not be a difficult task. The descriptions of the operations prove, I think, that it was not the parotid itself which was removed, but a diseased conglobate gland, of which there are usually two connected with the parotid. One is generally placed beneath that lobe of the parotid which extends lower than the angle of the jaw; the

other is imbedded in the very centre of the parotid, lying commonly opposite to the division of the external carotid artery into the temporal and maxillary branches.

The first is not very deep-seated, it is merely covered by the cervical fascia and the thin dependent lobe of the parotid gland. When it swells, it forms a tumour just below the angle of the jaw, and rather behind it; not fully circumscribed, not even in the incipient stage freely moveable; still where it is not very large, it may be easily enough extirpated. Anterior to it there is no part of consequence; behind it the trunk of the external carotid artery is placed; yet, by the fingers, the tumour may be safely detached from that vessel. This was the species of tumour extirpated by Mr. John Bell from about the angle of the jaw of the late Mr. William Dunlop.*

These remarks on tumours formed at the angle of the jaw, will be well illustrated by the following case, which was under the care of Mr. Anderson, with whom I saw the patient.†

In this patient there were three tumours about the angle of the jaw, one of which at least, had existed during seven years. The largest tumour, which was about the size of a pullet's egg, was

* Bell on Tumours, vol. ii. p. 216.

† The facts which I have mentioned in this case, were derived from different letters which passed between the patient and the medical gentlemen to whom he submitted his case. These letters I saw and read at the time the operation was performed.

seated between the mastoid process and the ascending plate of the jaw-bone. It was prominent, and in part moveable; it was as moveable as could be expected, since it was covered by a fascia. It could be moved from side to side, but it could neither be fully grasped by the fingers, nor its extent fairly defined; its depth, especially could not be determined. It might dip backward, but there was no proof that it did so; nay, from its being moveable, there was reason to suppose that it did not. The tumour next in point of size lay just below the angle of the jaw; was rather less than a walnut, and rolled freely under the skin and fascia, and the fingers could be made nearly to encircle it. When pulled forward, the large vessels could be distinguished behind, completely unconnected with the tumour. The third and smallest tumour was placed by the side of the last, and both lay nearly over the digrastic muscle.

From first perceiving these tumours, they had steadily increased, although slowly; or if at any period they had been stationary, it was after an incision had been made into the uppermost: their consequences were, therefore, to be dreaded, which made the patient naturally enough anxious to have them removed. With a view to this, he consulted several practitioners of the highest professional talents, both in London and Edinburgh.

Mr. John Bell, who was first applied to, was decided in his opinion, that the tumours were formed by dilated veins, but the veins were not simply varicose; there was something strange and undefined in his notions. He talked about the dilated veins being inclosed in a bag; and so fully was he impressed with the truth of this conjecture, that he actually made an incision into the largest tumour; blood only followed the knife, yet both the surgeon and his patient flattered themselves, that this cut would effectually resist the progress of the disease. Mr. Bell predicted, that by the inflammation consequent to this operation, the sides of the cyst containing the veins would become so thickened, that if it did continue to enlarge, the increase would be extremely slow. For a time the patient believed this. Soon, however, he was convinced that his hopes were ill-founded; again, therefore, he had recourse to Mr. Bell, who still persisted, that the nature of the disease was the same as formerly; and again he repeated his opinion that the sac would not enlarge with rapidity. Nevertheless, the swellings augmented, the patient became more and more anxious, for he began to lose confidence in Mr. Bell's prediction. He still believed that the tumours were produced by dilated veins; but now not even the boldness of Mr. Bell's tone could persuade him that they would not some time or other endanger his life.

Impressed with this belief, he submitted his case to three of the most eminent surgeons in London, all of whom coincided in opinion that the tumours were glandular; but regarding the nature of the complaint, there was a difference of opinion. One practitioner supposed the swellings to depend upon derangement of the biliary system; another thought that they might arise from the torpidity of the absorbent system; one turned his attention to the state of the bowels; while the other prescribed such medicines as are supposed to increase the activity of the lymphatics. All the three practitioners dissuaded the patient from submitting immediately to an operation; but one of them encouraged him to hope, that when the swellings had become larger and more prominent, they might be extirpated. He followed the prescriptions given him, but found that the growth of the tumours was uncontrolled. Disappointed in his expectations, and rendered solicitous about his safety, he was desirous of having the diseased parts removed by operation.

Mr. Anderson saw him, and gave him hopes that it was not yet too late to operate; but requested, at the same time, the advice of some other surgeons. Several were consulted; and the general voice was against operation. The patient, who was a most intelligent gentleman, was faithfully informed respecting what had passed. He was explicitly told, an operation

might prove unsuccessful, since, perhaps, it would be found impracticable to clear away all the diseased substance; the smallest portion of which being allowed to remain, he was taught to believe, would prevent the wound from healing. This was the only risk, there was no immediate hazard, because it was in the power of the surgeon to stop short at the point where actual danger began. The uncertainty, therefore, of the issue of the operation was what the patient had to consider, and to balance. He was apprised, that from the previous history of the tumours, there could be little doubt, that they would still continue to enlarge; their nature was also such, that there was reason to fear that ulceration would ultimately take place, fungus be formed, hectic induced, and death follow. On these facts the patient reflected, and his decision was, that an operation should be performed.

In an hour he was prepared. With firmness he seated himself on a chair, then reclined his head on the breast of an assistant, and with fortitude and unmoved countenance, bore a protracted and painful operation. An incision was made by Mr. Anderson from the root of the ear to below the angle of the jaw. It was of such a length as to expose fully the whole extent of the tumours. The smallest tumours were readily, after the division of the fascia, detached merely by the fingers, and when brought

away, the diseased substance was found included in a firm membranous capsule. The removal of the uppermost tumour was rather more difficult, owing to its connexion with the parotid gland. It had originally been formed by enlargement of one of the small glands, which are covered by the depending lobe of the parotid. As the tumour increased, it pushed this lobe upward and outward, and this was the only cause of difficulty. So soon as this lobe of the parotid was turned aside, the diseased gland was, with the slightest effort, started from its bed or cup, invested with its sheath.

After the first incision, all the other parts of the operation were executed by the fingers; and as each of the tumours were, after their removal, found to have their capsules entire, there could not possibly be any of the diseased substance left behind. Two little arteries which had been divided, were now secured, and the margins of the wound brought together and retained in contact. In a few weeks the wound was completely healed.

Plate VI. will illustrate the deep-seated connexions of a tumour, nitched in between the parotid gland and the digastric and stylo-hyoideii muscles. The latter only are interposed between the swelling and the external carotid artery. Above and below the line of these muscles, the tumour is absolutely in contact with that vessel.

On this account, a tumour which had formed behind the angle of the jaw in the woman Manderson, had a vigorous pulsatory motion, insomuch, that one would without care, have been induced to believe the carotid artery to be aneurismal. In this woman, the swelled gland does not simply lie over the carotid artery, it turns round its tracheal side, insinuating itself between the vessel and the posterior margin of the hyo-glossus muscle, so that by pressing aside the ligament running from the pterygoid muscle to the side of the neck, it touched the pharynx. This I was rendered certain of, by introducing a finger deep along the mouth, and examining the pharynx, where the tumour can be distinctly felt adhering to its side, and establishing connexions which completely forbade any operation.

Disease of the lower lobe of the parotid gland is not to be mistaken for enlargement of the conglobate gland, which it covers. Sometimes this lobe of the parotid gland becomes sacculated, forming a collection of watery viscid fluid. Such a tumour begins just behind the angle of the jaw, and from that nucleus, proceeds downward and laterally. As the swelling is covered by the fascia, it is consequently tense; and although the sides of the cyst be thin and pliant, fluctuation is obscure. Yet although ill-defined, it may generally, by care, be detected. This species of tumour does not require to be extirpated, its na-

ture, so long as it is sacculated, is simple; it is a mere body of saliva, hollowed out in the glandular substance. In the incipient stage, therefore, the tumour is to be opened, its gelatinous contents evacuated, and the inner surface of the bag irritated by passing a seton through it, or by stimulating injections.

Just below, and behind the angle of the jaw, I have mentioned that a sacculated tumour is sometimes formed by the lobe of the parotid gland. At other times, the internal jugular vein is dilated at the same place, into a considerable sized pouch. I have a cast which I received from my friend Dr. Monro, which very finely illustrates the position and external characters of a tumour of this nature. No operation can be performed here; the surgeon must, therefore, be careful, not to confound a dilatation of the jugular vein with a sacculated parotid tumour. In the latter, we cannot by pressure disperse the swelling; in the former, the tumour can be completely emptied by squeezing it between the fingers. There cannot, therefore, be any apology for a surgeon who mistakes the one for the other.

In planning the removal of a tumour from behind the angle of the jaw, the situation of the lobe of the parotid is to be kept in remembrance, because this connexion, will, in some measure, regulate the surgeon; it will direct the form of his incision. His object must be to avoid injury of

the glandular substance, not from any idea that a wound of it would affect the ultimate success of the operation, but because it would probably retard the cure. A salivary fistula would be the consequence, unless steady compression was applied and persisted in for some time after the removal of the tumour. This it would be desirable to avoid.

Such a tumour will, with the greatest prospect of avoiding the formation of a salivary fistula, be removed, by making a triangular flap of the skin over it, directing the apex towards the clavical. The knife is not in the first instance, to penetrate deeper than the fascia, from which the integuments are to be turned up. Next the fascia is to be divided by a similarly shaped incision, after which, the lobe of the parotid gland and the fascia are to be raised from over the tumour, and held back by an assistant during the time occupied by the surgeon, in detaching with the fingers the swelled gland from its adhesions behind.* If the fingers be alone employed for this purpose, there will be no danger of injuring any vessel, but where the scalpel has been used, the posterior fascial vein has been cut. This, although a trifling accident, may be easily avoided.

* Mr. Walker, after having insulated the tumour, "finding its roots to run very deep, and the artery pulsating strongly, the tumour being in actual contact with the external carotid, he put a ligature round the root of the gland, which came away on the following day."†

† Bell's System of Dissections, 3d edit. p. 249.

When the tumour is removed, the parts which have been raised are to be laid back, and retained in their place by a compress, supported by a twisted roller. Sutures will not, in any instance, be required to keep the edge of the wound together, but strips of adhesive plaster may be used.

Sometimes spontaneously, sometimes from blows about the angle of the jaw, but oftener from absorption of irritating matter from the gums, the antrum, or the recess of the nose, the little gland in the centre of the parotid, swells. As the gland lies deep, the tumour formed by it, is for a length of time, very ill-defined. Between the jaw and the mastoid process, we discover by examination, rather a fulness than a regular swelling, and the patient complains of tension and stiffness in the region of the parotid.

During the enlargement of this gland, it presses on the parotid, producing absorption of its substance, by which the tumour comes ultimately to take the place of the parotid: it is in the end, equally nitched in among the parts at the angle of the jaw, and its extirpation is equally impracticable. Unless, therefore, we resolve in the very early stage of the disease, to cut out the tumour, we shall never afterward have it in our power to accomplish that operation; nor even in the incipient period, can the swelling be taken away without some difficulty and danger. It is this difficulty, arising from the confined bed of the

tumour, and its occupying the place of the parotid gland, which has led the few who have removed it, to imagine that they had extirpated the parotid itself.

In cutting out this conglobate gland, the substance of the parotid is always considerably wounded, an incision having to be made through that portion of the parotid which covers the swelled gland, before the tumour itself can be reached. There is, therefore, in removing this gland, not only the immediate risk arising from its connexions, but likewise the secondary danger dependent on the formation of a salivary fistula. The first, where the tumour is small, will generally be overcome; for at that stage the diseased gland still continues to be defined by its capsule, which does not adhere very firmly to the morbid parts. Where the tumour is not bigger than a large nut, it may generally, by opening its sheath, be started from its cup. The formation of a salivary fistula will only be prevented, by maintaining for a considerable time after the operation, a firm and steady pressure on the wounded part of the parotid gland.

The excision of this gland can only be prudently undertaken where the tumour is still small. If large, the distinction of its sheath will be lost, by the extension of the disease to the neighbouring parts. This is, however, from the greater resistance, a slower process than where

the tumour is seated lower in the neck. When the conglobate gland in the parotid swells, the tumour is prevented for some time from dipping deep, by the resistance afforded by the pterygoid muscles; and by the ligament of the angle of the jaw it is hindered from encroaching on either the larynx or pharynx. Ultimately, however, these barriers are broken up. Then the tumour spreads in every direction.

I have twice examined the bodies of patients who had died from fungus hæmatodes of this gland. In the last instance, the ravages of the disease were most extensive, and the deformity produced, most hideous. The tumour, which began between the angle of the jaw and the mastoid process, had enlarged in the course of two years, to the size of a boy's head. It extended from just beneath the orbit on the left side, down to the clavicle, covering in its course, the side of both the upper and lower jaws, distorting the mouth and twisting the nose, and forcing backward the external ear. The surface of the tumour externally, was very unequal, but the integuments, although discoloured, were not ulcerated. Where, however, it projected into the mouth, it had formed a fungus which had displaced all the teeth, and which, during life, had discharged a great quantity of abominably fetid ichor, intermixed with fragments of both jaws.

The small gland, the parotid gland, and all the parts in the vicinity, were blended together into an unseemly, fetid, morbid mass, the greatest bulk of which had the decided character of fungus hæmatodes. In the centre of the tumour, we found a large insulated irregular pièce of new formed bone lodged.

Before quitting the angle of the jaw, the connexions of the portio dura must be attended to. This nerve, when passing from the foramen stylo-mastoideum lies behind the parotid gland, but it almost immediately dips into its substance. It continues a single and undivided trunk for about half an inch of its course. This part of the nerve runs in a slanting direction downward and forward, imbedded in the gland. Where the portio dura is escaping from the skull, it is deep-seated, and nearly in contact with the arteria posterior auris, and where that artery and the occipital arise by a common trunk, the latter vessel is also quite in the vicinity of the portio dura. By the styloid process, the nerve is separated from the internal carotid artery and jugular vein. About midway between the ascending plate of the jaw bone, and the mastoid process, the portio dura is nearly opposite to the posterior fascial vein, and the external carotid artery.

It is at this point, at a place where the nerve is still deeply covered by the glandular substance, that it divides into its branches, which separately

perforate the gland, to reach the cheek and the other parts on which they are to be distributed. Some of these branches pass upward, some forward, and others downward. The largest of these branches inclines upward and forward, and while still imbedded in the gland, it subdivides into a numerous set of twigs, which cover, as with a net-work, the zygoma and the arteria transversalis faciei. The largest of these twigs, runs nearly midway between the zygoma, and the parotid duct. The other divisions of this nerve ramify over the face, and about the side of the throat.

PLATE VI.—This view was taken from a full grown male subject. The arteries were injected with wax, previous to dissection. A is placed on the trunk of the portio dura, which has been carefully dissected out of the substance of the parotid gland. The branches and twigs of the nerve, were more minutely traced than has been represented. I wished merely to show the great divisions of the portio dura; those which require to be remembered when studying tic douloureux. This plate will likewise be useful in illustrating the deep-seated connexion of tumours formed about the angle of the jaw. The large vessels, and the stylo-hyoideus and digastricus muscles are fully exposed by the removal of the parotid and conglobate glands.

This view of the connexions of the portio dura will show, that the trunk of that nerve can

only be reached with safety by an incision made along the anterior edge of the mastoid process; at a part where the nerve is unquestionably deeper seated than it is further forward; but where it is, at the same time, less connected with important parts. By an incision beginning at the very root of the mastoid process, and continued downward and forward, along the anterior margin of the sterno-mastoid muscle, the portio dura may be reached. The dissection, no doubt, will require to be deep, but in performing it, the surgeon will not experience much difficulty. The lobe of the ear will require to be pulled upward, and held forward, while prosecuting this dissection. In performing this dissection, the nervus superficialis colli will necessarily be divided, where entering the lower angle of the parotid; the glandular substance itself will be injured, and the arteria posterior auris will be cut across. But these are the only parts which will require to be intermeddled with, in order to reach the nerve at its very exit from the stylo-mastoid foramen.

Where the disease is seated in the portio dura, it is hardly to be supposed that division of one or more of the branches of that nerve, will radically remove the complaint. Those who remember the deep situation of the nerve, where it divides into its branches, and the way in which these perforate the gland to reach the face, will

be convinced, that an operation performed on it after passing the parotid gland, cannot succeed; enough may be done to suspend the morbid action in the body of the nerve, for a short time, but generally the disease will recur. This is one cause of failure, but there is yet another, for the complaint does recur, even where the trunk of the affected nerve has been divided, provided it has been simply divided. Sometimes the pain returns within a few hours after the operation, which had led to a belief that the nerve had not been fully divided. The sensation at the instant of cutting the nerve, is so peculiar that no surgeon can be deceived; the re-production of the pain, depends on the manner in which the operation has been performed, not on the incomplete division of the nerve.

To insure success, a portion of the trunk of the nerve must be cut out. So much of it must be removed as will prevent re-union of the divided extremities. This ought to be a fixed principle, because on this the permanency of the cure will, in a great measure, depend: I would, perhaps, not be far wrong were I to say, that it entirely depended on the prevention of the re-union of the cut ends of the nerve. The facts with which we are acquainted would lead us to suppose, that anastomosis of the nerves is not of the same value to the nervous system, nor productive of any of

those striking effects, which arise from vascular inosculation.*

* Dr. Haighton has performed a series of experiments which throw considerable light on the consequences arising from division of nerves. The experiments made by this gentleman, and related in the 85th vol. of the Philosophical Transactions, go to prove, that it is by re-union or reproduction of lost substance, that divided nerves regain their functions. This position has been fully established by observations made on the nervi vagi of dogs. In eight hours after the division of both of these nerves, the animal died. In another dog, "I divided only one of the nerves of the eighth pair. I was surprised to see how slightly he was affected by it; for excepting a little uneasiness, there was scarcely any alteration perceptible, so that in a few hours after the operation he took food as usual. On the third day I divided the other nerve, but the same symptoms immediately supervened here, as followed the division of both nerves, in the former experiments: he continued in a state of restlessness and anxiety, with palpitations and tremors, until the fourth day, when he died. In another dog, in whom nine days were allowed to intervene between the division of the nerves, the animal survived the second operation thirteen days, and then died, very much emaciated.

"Another dog being procured, and one of the nerves of the eighth pair divided, I allowed six weeks to elapse before the other was cut through. This division of the corresponding nerve evidently deranged him, but in a much less degree than in the former experiments." It was not, however, till nearly six months after the last operation that he fully recovered his health.

This recovery of the functions of these nerves, might either depend on enlargement of the inosculating twigs, or it might depend on the re-union of the divided extremities of the nerves.

"If the first be contended for, this consequence ought to ensue, viz. that the eighth pair should now be entirely useless, and both of them may be divided a second time, without injuring any of the functions of the animal.

"If the last be granted, it must of necessity follow, that the medium of union possessed the same properties as the original nerve.

"I have now circumscribed the field of inquiry, and have drawn the question into so narrow a compass, that it is in the power of a single experiment to prove either the affirmative or negative. If now the eighth pair be divided a second time, in immediate succession, and the animal sustain it with impunity, I conceive it right to conclude, that the actions of these organs, which originally were carried on through the means of the eighth pair, are now performed by other channels, and that the true substance of the nerve is not re-produced. But, on the contrary, if the animal die in consequence of it, then I think it equally just to infer, that

On this I would ground my belief, that the recurrence of tic douloureux is dependent on a re-production of the lost substance, and consequent re-union of the divided extremities of the nerve. I must not, however, omit mentioning, it is the opinion of Mr. Abernethy, that re-production of the disease, is, in some cases, owing to enlargement of the anastomosing branches of the divided nerve. This opinion was fairly deduced from his facts. The disease was seated in the little finger, and many remedies had, without effect, been tried. The affected nerve was at last divided, and half an inch of its substance removed. The operation was instantly followed by loss of sensation in the part on which the nerve was distributed—the disease seemed to be removed. In three months the lady had regained the sensibility of her finger, and pressure occasioned a renewal of the unpleasant feeling.

From the recurrence of the morbid sensation

the new formed substance is really and truly nerve, because we know of no other substance which can perform the office of nerve.

"I shall rely then on the following, and consider it as my *experimentum crucis*:—

"Having the dog in my possession, upon which I divided the eighth pair of nerves, nineteen months before, I cut through both of them now, in immediate succession. The usual symptoms were immediately induced, and continued until the second day, when he died.

"After death, I carefully dissected out these nerves, and have preserved them as evidences of my success. I think I have now answered the question I proposed to myself, and can affirm, that nerves are not only capable of being united, when divided, but that the *new formed substance is really and truly nerve.*"

in the finger, after the removal of so much of the nerve, Mr. Abernethy thinks it probable that the re-production of the disease did not depend on the restoration of the lost substance, but was occasioned by an enlargement of the anastomosing twigs. Dr. Haighton's experiments, and other facts, would lead me to doubt the correctness of this opinion. The operation was precisely similar to these performed on the portio dura, when the surgeon cuts that nerve anterior to the parotid gland; one of its branches can only be divided,—the trunk of the nerve remains untouched—the disease recurs. So, in like manner, Mr. Abernethy only divided a branch of the ulnar nerve, the branch, indeed, which was chiefly affected; this suspended the disease; but as the trunk was entire, the complaint in time recurred. To have been conclusive, Mr. Abernethy ought to have cut out a portion of the trunk of the ulnar nerve itself.

Had this been done, and had the disease afterwards recurred, he might reasonably have ascribed the re-production of the complaint to the agency of the inosculating twigs. That conclusion, although, in the present case, at first sight plausible, is still liable to the objections I have stated; and it is likewise to be remembered, that as only one of the branches of the nerve supplying the finger was operated on, and as the other at the tip of the finger joins freely with it, and as

both have a community of sensation, no wonder that the disease should ultimately recur.

I have bestowed so much attention on this point, because it is to be the director of our practice; if Mr. Abernethy's doctrine be well founded, no operation can, in tic douloureux, be more than a palliative measure; but if it be admitted, that the re-production of the complaint depends not on an enlargement of the inosculating twigs, but is occasioned by the division of a branch instead of the trunk, we shall be induced to hold out a prospect of recovery from this most painful disease.

The parotid duct is a vessel of great importance: hence, its course is highly necessary to be known by the surgeon. It is formed by twigs from every granule of the gland. As these unite, the duct increases in size, and as it increases, it tends forward, and finally perforates the anterior margin of the gland. After which, it immediately applies itself to the surface of the masseter muscle. It is chiefly where traversing this muscle, and while dipping from its edge to reach the buccinator, that the course and connexions of the parotid duct require to be studied. Its course will generally be defined by a line extended from the junction of the lobe of the ear and figured portion, to midway between the root of the nose and the angle of the mouth. This is its direct course in nine out of ten bodies; but there are many points connected with the history of this duct,

very necessary to be understood—its relation to the large twigs of the portio dura—to the arteria transversalis faciei—to the socia parotidis—to the mass of fat lodged between the masseter and buccinator muscles, and to the facial artery and vein. Its termination must also be familiar to the student. How it is contracted, just before it opens on the inner surface of the cheek, and the exact place of its perforation, will require to be explained. These points may usefully be commented on, for they are of value in practice.

In its whole course, the parotid duct is accompanied by twigs from the portio dura, but excepting the one which has already been specified as running between the zygoma and the duct, none of them are large. The arteria transversalis faciei, arises from the external carotid, just before it has divided into the internal maxillary and temporal arteries, or from the latter artery. Its origin is, therefore, deep sunk in the substance of the parotid gland, and nearly as low as the commencement of the parotid duct. Presently, however, it perforates the anterior margin of the gland, and quits its former course. It inclines upwards, insomuch, that before it has reached the middle of the masseter, it is generally placed midway between the parotid duct and the zygoma. At this part it lies between the socia parotidis and the masseter muscle. While here, it generally breaks down into numer-

ous twigs, some of which twine about the ramifications of the portio dura, while others run to the facial muscles, and anastomose with the twigs of the temporal, the internal maxillary and facial arteries.

The transverse artery of the face is seldom of large size; never, indeed, except when it supplies those parts which ought to receive blood from the facial artery. Then it assumes a size and importance proportioned to the number of parts which it has to support. When the labial artery, where turning over the jaw-bone, was not larger than a sewing thread, I have seen the transverse facial artery equal to the diameter of a goose-quill. But in this subject, it furnished the coronary artery of both lips, as well as the nasal arteries. It also ran nearer to the parotid duct than it usually does, when the labial artery is of its common size.

Connected with the parotid duct, the transverse artery of the face, and the twigs of the portio dura, and covering part of the masseter muscle, we find the socia parotidis, a texture in every respect similar to the parotid gland, secreting a similar fluid, and pouring it by one or more little orifices into the parotid duct. The socia parotidis, however, is neither uniform in its size, nor constant in its place, and is even in some subjects altogether wanting. Where it exists, it sometimes presents the appearance of a broad

thin patch; at other times, there are two patches, or it is collected into a little knob. Sometimes it is continued from the edge of the parotid gland, accompanying the parotid duct to the anterior margin of the masseter muscle. But these are the anomalies of the socia parotidis. To represent it as it usually appears, it must be described as a little glandular process lying between the parotid duct and the zygoma, generally in contact with, or even overlapping the former, and seated somewhat nearer to the parotid gland than the middle of the masseter muscle. Frequently one or two little conglobate glands are found in the vicinity of the socia parotidis.

Leaving these parts, the parotid duct dips from the anterior margin of the masseter, over the mass of fat which is interposed between that muscle and the buccinator. When it comes in contact with the buccinator, it suddenly contracts to a very small size; in its previous course it is about the thickness of a large crow-quill, and its canal will admit a common sized probe; but where passing through the buccinator muscle, its orifice will hardly admit a catheter wire. It usually opens into the mouth opposite to the space between the second and third molar teeth of the upper jaw, a little below the margin of the gum. Just before its termination, the parotid duct is crossed, and touched by the facial vein, but the

artery inclines considerably nearer to the angle of the mouth.

After pointing out the situation of the portio dura, the parotid duct, the socia parotidis, the transverse artery of the face, and the facial artery and vein, a few remarks on the extirpation of tumours from this part of the face will not be out of place.

In removing tumours from this region, it ought to be a primary consideration to avoid injury of either of these parts, but more especially of the parotid duct, which occasions a most troublesome fistula. All this can, generally, in the extirpation of tumours, be guarded against. Let the student make himself fully acquainted with the line which the parotid duct follows, with its relation to the masseter muscle and the buccinator; let him bear in remembrance the conglobate glands which are in the vicinity of the duct, and let him not overlook the mass of fat which fills up the space between the buccinator and masseter muscles. If he be familiar with these points, he will have little to dread in extirpating a tumour from the side of the face, nor will he find much difficulty in avoiding the parotid duct.

There are two spots chiefly where tumours form, in which the parotid duct is concerned; it will hardly be necessary for me to add, that the one is where the duct is crossing the masseter muscle, and the other where it is passing from

the edge of that muscle to reach the buccinator. In the former case the tumour is usually produced by swelling of one of the little conglobate glands which lie by the side of the socia parotidis; in the latter, the tumour is originally formed by disease of the bundle of fat which occupies the hollow between the masseter and buccinator muscles, or by enlargement of a lymphatic gland lodged among that fat. The latter is, perhaps, a rare occurrence.

When a glandular tumour has formed over the masseter, the parotid duct will either be found lying directly behind it, or it will be displaced by the enlargement of the swelling; but in either case it will, generally, by tearing with the fingers, be easily separated from the morbid parts. Where, however, the tumour is formed by the contents of the space between the masseter and buccinator muscles, the position of the duct will vary according to the nature of the morbid parts. Where the tumour is adipose, and continues soft and pliant, if it have projected to any considerable extent from between the muscles, the duct will be more or less indented into the morbid parts, or even fairly encircled by them. Not only the parotid duct, but the facial vein also, may be sunk into such a tumour. The duct and vein can only be connected in this manner, with tumours of a soft texture. I have seen it surrounded by an adipose tumour, by a fungus

hæmatodes tumour, and by an anastomosing aneurism. In hard glandular swellings, the duct is projected on the front of the morbid parts, or it is pushed aside. Let these facts be studied, and we shall not hear surgeons talk of extirpating indiscriminately, and in the same way, the different varieties of tumours which form about the face. They will, on the contrary, remember, that the relation of the parotid duct, and other parts, will be varied according to the position or nature of the morbid parts. They will even be able to judge pretty accurately whether it will be found behind, or on the front, or sunk into the substance of the swelling.

PLATE VII.

FIG. 1. and FIG. 2. are plans illustrative of tumours connected with the parotid duct. FIG. 1. shows a tumour, glandular but not very firm, seated over that portion of the duct which traverses the masseter muscle. Not only the duct, but also some of the twigs of the portio dura, are connected with the posterior surface of the swelling. It will be necessary to explain those parts in order: A is the little glandular and slightly knobbed swelling. B represents that portion of the parotid duct nearer to the gland than the tumour, and C that part anterior to the tumour. D is the facial vein, which, in its course, is seen traversing the buccinator muscle, and crossing the termination of the parotid duct. E the facial artery, very serpentine in its course, and observed from where it turns over the jaw-bone up

to the angle of the mouth inclining forward, and crossed just at the angle of the mouth by the insertion of F, the zygomaticus major muscle.

FIG. 2. is a plan, showing the relation of the parotid duct to a tumour which has protruded from between the masseter and buccinator muscles. It is a tumour of a soft texture, so soft, indeed, that, even although not large, the duct is indented into its surface, and would, had the tumour continued to increase, have been fairly buried deep in its substance. This species of tumour is closely connected with the duct. A A is the swelling. B B B the parotid duct, which runs over the anterior part of the tumour. C is the facial vein, covered, along part of its course, by the tumour.

A tumour of this size may easily be extirpated, and the parotid duct saved, provided the morbid parts have not formed adhesion to the cheek. When, however, the cheek and tumour are incorporated into one mass, the facial vein cannot escape; buried in the diseased parts, it must be removed along with them. This is, however, a trifling circumstance, compared with what is sometimes required to be done. It is an absolute nothing, in comparison with what must be done and taken away where the gums are involved.

In this sketch the tumour is circumscribed; nitched, indeed, into the small and confined space between the masseter and buccinator muscle, but so free from attachment to the parts in the vicinity, so well defined, a mere knob, that except from the position of the parotid duct, there could have been no difficulty in its excision. It is one of the most favourable cases which a surgeon can expect to meet. It is one where there ought to be no hesitation, regarding the propriety of operation. I would even give the patient a chance, where the tumour simply adhered to the cheek; but I would never, on any consideration, or under

any circumstances, attempt the extirpation of a tumour when connected to the gums. The mangling and scraping, and the risk of previous absorption, and the almost physical impossibility of removing completely the whole of the diseased parts, preclude, in my opinion, any reasonable prospect of success for such an operation. To attempt it, therefore, conscious as we must be that it cannot succeed, is only putting the patient to the pain of a fruitless operation. It is unquestionably the duty of every surgeon to undertake an operation, even where the prospect of success is not very great; but it surely cannot be incumbent on him to attempt what he is fully aware he cannot execute. I believe there is not one instance in which recovery has taken place, where an operation had been performed under such circumstances; nay, there are very few surgeons who would either advise or perform the operation.

Mr. John Bell did, in the case of Mr. Taylor, endeavour to extirpate an extensively diseased mass from the hollow of the cheek; a mass covered by very unhealthy skin, rough, discoloured, warty, and puckered, and firmly fixed to the gums. This Mr. Bell hoped to dig away at the expense of the parotid duct and the facial vessels; but although he cut widely, sparing nothing which savoured of disease, still the issue was unfortunate. The complaint recurred, and ultimately killed the patient.

That a tumour has formed between the masseter and buccinator muscles, is ascertained by examination with a finger introduced into the mouth. In this way a projection will be discovered just between the gums of the upper and lower jaws, extending some way forward, and

pushing the cheek inward. When the tumour is solid in its consistence, has continued for a length of time, is not perceptibly moveable, or, when moved, carries along with the lining membrane of the cheek, and when this membrane feels indurated, and the patient cannot freely open the mouth, it may be inferred that the morbid parts have extended backward behind the ascending plate of the maxilla inferior and the buccinator, lodging themselves between the internal and external pterygoid muscles.

Such a case is hopeless; an operation is out of the question; no prudent surgeon would propose it, nor any intelligent patient, when apprized of the danger, insist on its performance. Yet, although under such circumstances, the surgeon has it not in his power to extirpate the morbid parts, still he is not to desert the patient. I have known a solid tumour of this kind, which had continued for a considerable time, and which had completely curbed the motions of the jaw, absorbed.

The patient was under the care of Dr. Brown, with whom I saw him. He was a stout young man, with a fulness on the one side of the face, just before the edge of the masseter muscle. This muscle was rigid, and the limits of the tumour externally, were not distinctly marked—there was a gradual change from induration to natural

texture. Internally, a hard knob was readily discovered pushing inward the lining membrane of the cheek. This tumour extended as far back as the finger could reach, which was not very far, since the mouth could not be opened. Although, therefore, it could not be proved, by actual examination, still it was evident, from the effects produced, that the tumour must be extended deep behind the ascending plate of the lower jaw-bone. Its nature, connexions, and position, were altogether such as to forbid any operation. Various local remedies were tried, but the tumour did not begin to decrease till sometime after a seton had been passed through the skin below the jaw. At last it was completely removed by the absorbents.

The result of this case was highly satisfactory, yet it is not mentioned for the purpose of recommending local remedies in preference to the knife; it is brought forward to show, that, even in the worst of cases, perseverance may do good. It never can furnish an apology for neglecting to remove a tumour of a similar kind, when within the reach of an operation.

In extirpating tumours, the primary consideration with the surgeon ought to be, to remove the morbid parts without injuring the capsule which defines them. If he accomplish this, he has nothing to dread from a return of the disease.

Where, however, he nibbles at the tumour with the knife, and cuts it away piece-meal, he has no security; amidst the blood and confusion he can never say when the whole is taken away; much may be left,* or too much may be removed, the clear bed of the tumour can never be fairly exposed.

There is every reason, therefore, to induce an operator to plan his operation so, that the tumour may be cut out entire; nor about the face, will this be so difficult as many would imagine. The parotid duct is to be avoided. Its relation to the tumour, it has been seen, will vary according to the locality of the latter, but fortunately, these variations can generally be pretty accurately ascertained before beginning our operation.

To this, however, we must never trust; our dependence for the safety of this vessel must be placed in exposing the duct nearer to the parotid gland than the tumour. If this be done, its firmness will be its protection during the subsequent progress of the operation.

The tumour, in those cases where the duct lies behind it, is to be exposed on every side, either by a careful dissection with the scalpel, or by working with the fingers. In whatever way its lateral connexions are destroyed, its final separa-

* If it would serve any useful purpose, I could relate different cases from my own observation, to corroborate this assertion; at present, however, I have more than one reason for declining the task.

tion, from its adhesion to the parts behind, is to be accomplished by the fingers. This will seldom be difficult, never indeed, unless where the capsule of the tumour has, by inflammatory adhesion, been fixed to the neighbouring parts. Then, no doubt, it is less easily accomplished, but still, by care and cautious working with the nails, it may be removed without injury of either its capsule, or of the parotid duct. These are to be sedulously guarded against; the first secures the patient from a return of the disease; the second from the formation of a salivary fistula.

The excision of tumours lying anterior to the parotid duct, is generally very simple, but the removal of those in which the duct lies before the tumour, is more difficult; and where the duct is imbedded in the morbid parts, we can seldom, where the tumour is of a specific nature, accomplish a cure. Considering the greater difficulty of extirpating tumours lying behind the parotid duct, it is the duty of the surgeon to enforce the early removal of every swelling, situated between the masseter and buccinator muscles. If executed while the tumour is small, and as freely moveable as its confined situation will permit, the surgeon may reasonably hope to be able to extirpate it fully. If, however, he delay till it has become wedged into that hollow, till it has formed firm adhesion to the surrounding parts, and till the cheek has become indurated, all reasonable

hope from an operation, must be at an end. It may be attempted, but cannot succeed.

From this view it will appear, that no time ought to be lost in attempts to discuss such tumours by external applications. Here an operation must be speedily performed, or the patient must resolve to run all hazard. Better, therefore, that a surgeon should unnecessarily extirpate a simple glandular swelling, than that he should, on the presumption of a tumour being simple, permit it to gain ground, and form connexions, from which, were it really of a specific nature, he could not afterwards detach it.

Since this sheet was sent to press, I have been consulted by a gentleman regarding a tumour on the cheek, which began some years ago, soon after the extraction of one of the molar teeth from the upper jaw. It has, since its commencement, continued slowly to increase in size; it is now as large as an orange, elastic when touched, free from pain, but covered by thin integuments of a reddish purple colour. It extends from the anterior margin of the masseter muscle, to the angle of the mouth, and reaches from the lower edge of the orbit, to the alveolar processes of the lower jaw. Between the mouth and the tumour, there is only a membrane interposed; not thicker than writing paper, but the morbid parts are perfectly moveable; they have little connexion either with the skin, or lining membrane of the cheek.

The tumour seems to be simply steatomatous, and its connexions are not of such a nature, as to forbid an operation. The parotid duct, some of the branches of the portio dura, and the facial artery and vein, will, no doubt, be implicated, but they could surely be extricated; our objection to an operation, is the general state of the patient's health, and his advanced period of life.

He is above sixty, and has been an irregular living man; his constitution seems injured, his nose is carbunculous, and the skin of his face is far from having a healthy appearance. When I view these facts, and take into consideration the thinness of the integuments covering the tumour, and separating it from the mouth, I cannot divest myself of a fear, that adhesion would not take place after the excision of the tumour. It is probable, that in a constitution such as this gentleman possesses, the wound would slough, inducing that febrile condition so inimical to the success of any operation. On this account I dissuaded the patient from urging the extirpation of the swelling, which he wished to have removed.

In extirpating a tumour seated behind the parotid duct, the first point is to expose the duct, just where passing from the edge of the masseter; then it is to be traced forward along the whole extent of the tumour. In doing this, the duct is to be left attached to the integuments on one

side; then with the fingers, the coverings of the tumour and the duct are to be turned aside, a hook is to be struck into the tumour, which will generally, from the quantity of loose fat in which it lies imbedded, be easily pulled outward, when it may be detached, by snipping with the scissors the fatty process by which it is connected to the deep-seated parts. By cutting this, the nutrient vessels of the tumour, which are derived from the internal maxillary artery, will generally be divided, but they will seldom be found of such a size, as to require the ligature.

To some, it may seem that in describing the external incision along the course of the parotid duct, I have overlooked the risk of injuring the facial vein. This is really inconsiderable; generally the vein is pushed towards the angle of the mouth by the tumour, but even if it did lie over the morbid parts, and if it were cut across, it would prove of very little consequence.

Where the tumour lies either anterior or posterior to the parotid duct, it can, and consequently ought to be removed with its capsule entire; but when the duct is imbedded in a fatty mass, the sheath of the morbid parts must be cut into, and the tumour extirpated in two portions. Where the disease is not of a specific nature, the duct may be safely extricated, and a cure accomplished; but where the duct is imbedded in a specific tumour, it is hardly possible to dissect it out, with-

out some of the morbid substance adhering to it. I would, therefore, in such a case, prefer cutting out the portion of the duct connected with the tumour, to any attempt to extricate it. Where, however, the tumour is not of a specific nature, I can confidently speak of the propriety of dissecting the duct out of the substance of the swelling.

In extirpating an anastomosing aneurism from the living subject, I have found it necessary to dissect the parotid duct, and a large branch of the portio dura, from amongst the substance of the tumour, so as to insulate them completely along nearly three quarters of an inch of their course. To the result of this operation, I would call the attention of the student. It was such, as, *a priori*, might have been inferred from Mr. Hunter's experiments on adhesion. As the case to which I have alluded is interesting, I shall transcribe it from my note-book.

"A middle-aged and stout young man, lately applied to me for advice, respecting a large, livid, and compressible tumour, which was seated in the vicinity of the right orbit. On inquiring, I was told that the swelling had existed from his birth, that it was sometimes more distended than at other times, that it seldom was productive of pain, except when injured, on which occasion it poured out a considerable quantity of fluid blood. The patient likewise stated, that the tumour

never pulsated nor throbbed, but during exertion or walking during a very hot or very cold day, it became exceedingly tense.

"Externally the tumour covered about one-third of the temporal extremity of the upper eyelid; it likewise occupied the whole extent of the lower one, the folds of which were separated by the blood to such an extent, as to produce an unseemly, irregular, and pendulous swelling, which hung down over the cheek. Towards the outer canthus of the eye, the morbid texture was interposed between the tunica conjunctiva and the sclerotic coat, forward, to within the eighth part of an inch, of the attachment of the lucid cornea. It was chiefly in this direction, that the disease was spreading. From the external angle of the eye the tumour was prolonged both outwards and downwards. In the first direction, it extended to the point of junction of the temporal and malar bones; in the latter, it descended nearly half an inch below the line of the parotid duct.

"Through its whole extent, the tumour was free of pulsation; no large artery could be traced into it; by pressure, it was readily emptied of its contents; but slowly, on the removal of the pressure, it was again filled. When emptied, by rubbing the collapsed sac between the fingers, a doughy impression was communicated to them. On the surface, it was of the dark purple colour of the

grape, with a tint of blue on those parts covered by the skin, but where invested by the tunica conjunctiva, it had a shade of red. It was cold and flabby, communicating to the fingers the same sensation which is received on grasping the wattles of a turkey cork."

DESCRIPTION OF PLATE VIII.

FIG. 1.—This figure affords an accurate representation of the situation and external character of the aneurismal tumour just described. The course of the parotid duct, may be shown, by a line drawn from the junction of the lobe with the cartilaginous portion of the ear, to the point intermediate between the root of the nose and the angle of the mouth. The situation of the branch of the portio dura, which was, along with the parotid duct, dissected from the diseased substance, will be readily remembered. It lies a little nearer to the zygoma than the parotid duct. These are the chief points which this drawing is meant to illustrate; yet it will also have its use in explaining the extent of the tumour, and its connexions with the eye-lids.

"As the tumour was increasing, and threatened to extend over the eye, the patient was anxious for its removal. By a careful examination, I was satisfied that it might be extirpated; the arteria transversalis faciei, the largest branch of the por-

tio dura, and the parotid duct, would unquestionably be found more or less connected with it. On the sixth of May, I performed the operation, in presence of Dr. Balmanno, Dr. Brown, and Dr. King; and was assisted by Mr. Russell.

" I began by detaching the lower eye-lid along its whole extent, then I readily enough dissected away that part of the tumour adhering to the sclerotic coat, and I next removed that portion of the tumour which adhered to the upper eye-lid. This being done, I tied a pretty large artery, which passed into the tumour from the outer and lower part of the orbit. The vessel lay just to the temporal side of the inferior oblique muscle. The next stage of the operation consisted in dissecting off the tumour clearly from the aponeurosis of the temporal muscle—the zygomatic process—from the malar bone, and from over the large branch of the portio dura, and the parotid duct. After the great body of the tumour was in this way removed, I found that still a part of the spongy morbid mass remained attached to the parts behind the parotid duct, and portio dura; I also discovered that some of the tumour dipped beneath the fascia of the temporal muscle, which was reticulated.

" From these parts there was a general oozing of blood, and from the divided transverse facial artery, as well as from the arteries which perforated the malar bone and the masseter muscle, there was a pretty profuse bleeding. The vessels

I secured, and then with the forceps and scissors I cleared away the diseased matter from behind the parotid duct and branch of the portio dura, both of which were thus detached from all connexion with the neighbouring parts. In the same way I was obliged to cut out a quantity of diseased substance from behind the zygoma. As the morbid parts were here ill-defined, and much intermixed with the fibres of the temporal muscle, a considerable part of it required to be taken away; now, in doing this, the deep-seated anterior temporal artery was divided. What of it remained on the cheek adhered so firmly to the zygomatic muscle, and was so closely incorporated with its substance, that the one could not be separated from the other.

"In performing the latter part of the operation no large artery was divided, and all those which had been cut were secured, yet there still continued a considerable oozing from the surface of the malar bone, and from about the zygoma.

"Immediately after the operation, the insulated part of the portio dura and of the parotid duct were laid back on the masseter muscle, and the edges of the integuments were kept in contact over them, by means of a single suture. Over the malar bone the lips of the wound could not be made to approach, nor did the oozing from the bone cease. A fold of linen and a layer of sponge, were therefore laid into this part of the wound,

and retained there by a compress and bandage, applied so tightly as to restrain the bleeding.

"The sponge was kept firm in its place during two days, then it was removed without a renewal of the bleeding. So soon as the sponge was taken away, we endeavoured with strips of adhesive plaster, to bring the lips of the wound nearer to each other. The sore soon began to form granulations, which, in a few days, notwithstanding the use of regulated pressure, became so luxuriant, that they had risen considerably above the level of the wound. They had not a healthy look, but on the contrary formed a flabby red fungus, perfectly unconnected with the margins of the sore.

"Although the granulations did not show any tendency to form skin, yet the sore was daily reduced by the approximation of its edges. An eschar was repeatedly formed on the surface of the granulations, by the application of sulphate of copper, without the effect of checking their exuberant growth, or disposing them to form skin. Still, however, by bringing the edges of the sore nearer to each other, its limits were reduced, and in the end were brought to a size little larger than the diameter of a shilling, without apparently the cicatrization of a single granulation. When the sore was reduced to this diameter, new skin began to extend from the margin over the granulations, which, before the end of

July, were completely covered by a new formed pelicle of skin, which occasioned a very little deformity of the countenance."

It is now more than three years since the sore was healed, and still the patient continues free from any return of the disease, and the cicatrix is becoming smaller. The only inconvenience which the patient now experiences, arises from the motion of the upper eye-lid, being impaired by its adhesion to that part of the sclerotic coat from which the tumour had been dissected. From the same cause, the ball of the eye does not possess the same latitude of motion as formerly. It requires a considerable effort to turn the pupil toward the nose.

This case is not only valuable in so far as it illustrates the surgery of the side of the face; but it is also interesting, as illustrative of one species of anastomosing aneurism.

In the aneurism from anastomosis, there is no loss of muscularity—no dilatation of the coats of the vessels from weakness; there is no partial growth from any individual artery; but, on the contrary, the tumour is formed by an enlargement of the inosculating twigs. By the dilatation of vessels, which in the healthy state, would hardly have been visible to the naked eye, the pulsating mass is composed. This is, therefore, a disease of a singular nature, and its characters are so decidedly marked, that we cannot but wonder that

it should, till so lately, have almost completely escaped notice. It is most unquestionably certain, that hints of its existence are to be met with in more ancient works than Mr. Bell's Principles of Surgery; but they were so vague, and had so little effect in calling the attention of surgeons to this affection, that Mr. Bell is justly considered the first who accurately described aneurism from anastomosis—a disease which differs widely from true aneurism.

In anastomosing aneurism, the blood remains always fluid in the vessels, and these, though enlarged, still retain their contractibility, and are still competent to the propulsion of their contents by their own action. The structure of the tumour is also altogether unlike that of true aneurism. The blood, in place of being lodged in a circumscribed sac, is contained in the extreme vessels, which are, in this disease, much enlarged and exceedingly active.

Mr. John Bell describes the tumour as made up of a cellular structure like the placenta, and into each cell he tells us an artery opens and a vein rises from it. In this disease there is "a violent action of the arteries, and a mutual enlargement of the arteries and veins; while the intermediate substance of the part is, by this impulse, and in course of time, slowly distended into large intermediate cells, which dilate at last into formidable reservoirs of blood."—"The

veins form a conspicuous part of such a tumour, but the intermediate cells are as sensible a part of the structure; for when the tumour is emptied, we feel that the blood is repressed from the sacs in the veins; and when the tumour is large, with a purpled surface, we feel the sacs individually prominent; when they burst we see the blood flow out from them; and when the tumour is extirpated, they seem to compose its chief bulk."

"The altered structure of the part resembles, then, that imaginary parenchyma or cellular substance which the early anatomists of Europe presumed, and indeed pretended to prove by injection, was interposed betwixt the extremities of the arteries and those of the veins in all parts of the body, especially in the secreting viscera."

These are Mr. Bell's observations on the structure of such tumours, and it is but justice to add that they are corroborated by Mr. Freer, who has injected one of these tumours with mercury, so as satisfactorily to demonstrate its cellular structure. Other pathologists deny the existence of these cells, affirming that the tumour is entirely composed of a congeries of coiled up vessels.

I can readily conceive how both Mr. Bell and Mr. Freer may have been deceived. Till the time of the illustrious Haller, it was currently believed that the vesiculæ seminales were cellular. This anatomist unraveled them, and observed

that they were really composed of convoluted tubes. Were I to speak from my own observation, regarding the texture of the tumour in anastomosing aneurism, I would certainly be inclined to believe that it was really cellular.

There would seem to be two species of anastomosing aneurism: one in which the arteries are chiefly affected, and another in which the veins are principally concerned. The first is an acute and most dangerous disease; the latter is chronic and less to be dreaded.

The arterial anastomosing aneurism begins from a mark which had existed as a discoloured spot from birth; or it appears at first like a small fiery pimple, or it succeeds a blow or some other injury, or it begins without any obvious exciting cause. In whatever way it begins, it is at first small, but gradually increases in size; the pulsation, which originally was obscure, becomes a prominent feature in the complaint, the swelling still enlarges, the pain and feeling of distension augments, "and when the cells are enlarged into sacs, and the mutual communications consequently free betwixt the extreme arteries and veins, the whole tumour pulsates distinctly, and when excited by exertion or muscular struggles, it throbs furiously; the tumour assumes then a purple hue; the apices of the sacs become sensibly thin; the patient is alarmed from time to time with slighter hæmorrhages, which becoming more frequent

from various points, and very profuse, he is at last debilitated, changes his complexion and colour, loses his health, and dies."

From the first to the last the swelling is compressible, and it is even more easily reduced in size by pressure, in the advanced, than in the early stage, when it is " of a doughy consistence, and having a woollen or cushion-like feeling, when pressed and moulded under the finger." In the latter stage, in those cases which I have seen, the tumour was easily emptied; but on the removal of the pressure, was almost instantaneously filled by one, two or three large tortuous arteries which could be traced into its substance, and which were left beating much more vigorously than the arteries in any other part of the body. The working of these arteries and the labouring of the tumour, when the circulation is hurried by exertion, or increased by hot weather, is most dreadfully increased. And during these periods of excitement, it is proper to mention, that the heat of the tumour, as measured by the thermometer, is actually greater than the temperature of the other parts of the body.

From the description of anastomosing aneurism, it will appear to be a peculiar affection of the vascular system, and therefore not to be treated on the general principles applicable to true aneurism. In the latter, we tie the great artery considerably above the aneurismal spot, and we allow the tu-

mour to decay from operations carried on within itself; in the former, we must proceed on a very different principle, for were we to rest satisfied by securing the arteries passing into the tumour, we would only suspend its growth till the collateral vessels had enlarged. So soon as this took place, and experience proves that it is not a tedious operation, the tumour would again be supplied with blood, and would again resume its peculiar character, and proceed in the extension of its limits. Any attempt, therefore, to cure this disease, by ligature of the arteries which support it, is entirely out of the question. Mr. John Bell strenuously argues the necessity of cutting out all the diseased parts; and in equally decided terms, reprobates any interference where we judge this to be impracticable. This seems to be the generally received opinion of surgeons on this subject; and it was one, the propriety of which I never ventured to call in question, till I accidentally witnessed a case, which showed in the most striking manner, the expediency of acting differently, under certain circumstances.

My brother was requested to visit Mr. ——, on Wednesday the 18th of October, 1809, about seven o'clock in the morning. He went, and found, that during the night, the gentleman had lost a great quantity of blood, from a wound which had been made about fourteen days before by a surgeon who had opened the temporal artery, on

account of an apoplectic affection. The wound had never healed, neither was this the first time he had been alarmed by profuse bleeding from it. Means had, indeed, been employed to prevent the hæmorrhage. Compression had been tried, and an attempt had even been made by a practitioner to tie the trunk of the injured artery. But neither the one nor the other proving effectual, my brother was called in on the third day after the application of the ligature. He desired that I would visit the patient along with him.

When we examined him, he was complaining of considerable pain and tenderness along the side of the head, which was greatly distended. The integuments over the temporal muscle, the eye-lids, and the right side of the face, were swollen by effusion into the cellular membrane. The finger, when pressed firmly on those parts, sunk deep, and the pit remained for some minutes. We now directed our attention to the parts more immediately concerned with the bleeding, and were surprised on finding the wound filled by a tumour, oblong and about the size of a hazel nut—of a purplish colour—beating in unison with the action of the arteries—easily compressed, but becoming instantaneously, on withdrawing the pressure, full and tense; and from a small orifice, projecting with great impetus, a stream of arterial blood.

We could have no doubt that this was an anastomosing aneurism—the ready compression of the

defined purple tumour—its throbbing and hard-working under the restraint of pressure—its full and rapid distension on removing the pressure—the copious, though small stream of pure blood which sprung from the lacerated looking hole, and the strong pulsation of the trunk and branches of the temporal artery, were characters which no one could mistake. They established in the most decided manner, the nature of the disease, which, as yet, appeared manageable.

The beating tumour was circumscribed, and of small size: the diffused swelling had the appearance of arising from intersticial fluid effused beneath the skin; only the temporal artery could be felt pulsating with unusual vigour, and not even a twig of the frontal artery could be traced into the diseased part; nor could any undulation be perceived in any part beyond the limits of the tumour. This circumscribed swelling was situated about midway between the zygoma and the margin of the planum semicirculare, just over the fibres of the temporal muscle, and we supposed exterior to the fascia of that muscle.

On a full review of the case, and on taking into consideration the nature of the disease we had to contend with, the failure of pressure, and the attempt, which, without benefit, had been made to secure the artery, we resolved on dissecting out the tumour. My brother, with a full and instantaneous sweep of the scalpel, first

on the one side, and then on the other, insulated the tumour from its lateral connexions, and without loss of time, finished the removal of the morbid parts, by separating them from their deep-seated connexions. In doing this, it was found necessary to take away a part of the temporal muscle. So soon as this was done, blood gushed from behind the zygoma, and from innumerable pores in the situation of the temporal muscle it spurted with impetuosity and per saltem. No sooner had the wound been cleared with the sponge, than it was filled and overflowed. The trunk of the temporal artery still laboured violently, and we now found that pressure on this vessel did not interrupt the bleeding.

The disease, which before operation appeared to have been circumscribed, was in reality widely extended. It descended beneath the zygoma—was incorporated with the substance of the temporal muscle; hence the body of the tumour was firmly bound down, by the aponeurosis of the temporal muscle, and was liberally fed with blood by the temporal branches of the internal maxillary artery. When the tumour was cut out, the base of the wound could readily be compressed by the thumb thrust down behind the zygoma; but so soon as the pressure was removed, it heaved, worked, and puffed up, till it rose to the level from which it had been squeezed. All this was accomplished in an instant, and was followed

by most impetuous bleeding. We plainly saw that it was out of the reach of surgery to dig out the placenta-looking spongy pulsating mass from its recesses behind the cheek-bone.

Had this been resolved on, during the attempt to execute our purpose the patient must have lost a great quantity of blood; and after all, I do not believe that the diseased parts would have been fully taken away. Under these circumstances, we were reluctantly compelled to thrust a sponge, firmly wedged down behind the zygoma, and afterward we trusted the prevention of hæmorrhage to compression kept up by the twisted bandage.

The tumour which was removed had quite the usual structure of anastomosing aneurism. The case was curious, however, because, although the disease was extended deep behind the malar bone, still as the morbid parts were bound down by the strong aponeurosis of the temporal muscle, except at the point where the external swelling was seated, no pulsation, no undulation, nor motion of any kind could be perceived, except at that spot. The short duration of the complaint, and the apparent small size of the tumour, deceived us as to the real extent of the disease, and led us to operate. But so soon as the superficial part of the tumour was taken away, we saw enough to convince us, that any further attempt in the way of cutting, would have been fruitless.

It was not with superficial arteries we had to contend; on the contrary, it was with branches so sunk into a deep and inaccessible hollow, that had we even completed the removal of the whole of the diseased parts, still the bleeding must have been commanded by the sponge. We, therefore, in using the pressure at the time we employed it, had a two-fold object in view; our primary endeavour was to restrain the hæmorrhage, but we trusted that, if the pressure could be steadily and firmly kept up for a sufficient length of time, it would not only prevent the bleeding, but we hoped, that it would also produce a consolidation, or destruction of what remained of the diseased substance. Such was our wish—how well we succeeded, will be learned from the subsequent history of the case.

On Monday, the 23d, all the dressings were removed except the sponge, which remained firmly wedged in behind the zygoma, and likewise adhered firmly to the bottom of the wound above the zygoma. There had been no hæmorrhage, and very little secretion of pus, but the little which had been formed, was very fetid. The edges of the wound looked clean and healthy.

On the 29th, the sponge was equally firm as at last dressing. On slightly moving it, a small quantity of blood oozed from its side. There was no appearance of reproduction of the tumour.

Till the sixth of November the sponge continued slowly to be detached, and on that day it came away, leaving the base of the sore healthy, the granulations firm, and the discharge moderate. The original disease was completely destroyed by the pressure of the sponge, which was kept steadily in its place by the twisted bandage.

After the sponge came away, the sore daily contracted in its dimensions, and in a short time was completely cicatrized. The beating about the head, which had formerly distressed the patient so much, and for the removal of which, the temporal artery had been opened, was now hardly complained of, and the general health was much improved.

The operation of arteriotomy had been twice performed on this patient. The first time the temporal artery was opened, the bleeding readily ceased, and the wound healed kindly. On the last occasion, the bleeding was never fully commanded, nor did the wound heal. Its lips were forced asunder by the new pulsating growth, which before my brother was called in, had repeatedly burst, alarming the patient and his friends, by effusing a prodigious quantity of florid blood. I have never heard of any patient in whom arteriotomy acted as the exciting cause of anastomosing aneurism; nor am I convinced that it was the exciting cause in even this case. The tumour, although connected with the superficial temporal

artery, was more intimately connected with the deep branches of the internal maxillary artery.

Were speculation warrantable, it might be supposed that the tumour in this patient had existed beneath the temporal fascia, before the artery had been opened—that the lancet had penetrated into it while opening the vessel, and that afterwards the morbid parts had sprouted up through the incision in the fascia, and involved the superficial arteries in the propagation and extension of the disease. It is hardly conceivable, that had the disease been first excited by the puncture into the temporal artery, it could in the short space of fourteen days have extended so far beneath the aponeurosis, while it remained so small and circumscribed exterior to it. The superficial tumour seemed more of the size of a fortnight's growth, than the deep-seated one. Indeed it is probable, that the throbbing and unpleasant sensations in the head, which called for the performance of arteriotomy, had been produced by the working of the deep-seated tumour.

It is a curious circumstance, that the operation of opening the temporal artery should have unfolded the true nature of this gentleman's complaint. I cannot suppose, that in saying this I convey the slightest insinuation against the medical attendants for their not having sooner ascertained the precise nature of the case. I rather point out a fact hitherto unnoticed in the history

of anastomosing aneurism, and intended to show, that where the tumour is seated beneath a firm and unyielding fascia, its working and beating may escape detection by external examination, and about the head may, to the patient, convey the feeling as if it were within the cranium. Such an idea may lead the practitioner to a belief of the patient being threatened with apoplexy; and may, as in the present instance, induce him to open the temporal artery. If, in doing this, he penetrate the aponeurosis, he will soon have clear evidence of the true character of the disease he has interfered with.

From the successful result of the firm pressure employed in this case, I would be led to operate, even where I had but little expectation of being able to remove the whole of the diseased substance, provided the tumour was seated over a bone, and in such a position that I could employ sufficient compression.

This case will be considered as valuable; the characters of the complaint were decided, and had the extent of the disease been previously known, an operation would not have been undertaken; yet the issue of it will, I think, establish the propriety of giving the patient the chance afforded by an operation, even although from the circumstances of the case, we know, *a priori*, that it must be incomplete. This is a position directly the reverse of that laid down by Mr. John Bell,

who tells us that we are "not to cut into, but to cut it out." This I should have believed, had I not witnessed the beneficial effects of an opposite conduct in the present instance—a case in which there was no alternative. The operation was begun under the impression of the practicability of extirpating all the diseased matter, but it was soon discovered that the morbid parts could not be fully dissected away.

"We were much pleased, on finding, as the sponge came away, the sore looking clean, furnishing firm and healthy granulations, with a moderate secretion of good pus, where we had dreaded a renewal of the morbid texture and bloody discharge. I am convinced that this gentleman owes his recovery to the operation and subsequent compression; but the one was undertaken on the idea that the disease was superficial and circumscribed, while the other was had recourse to, in order to avoid immediate death, which would have been the inevitable consequence, had it not been employed.

The favourable result of this case would embolden me to operate in even a very bad case of this disease, and in which I could have no hope of being able to remove with the knife all the morbid parts; but I would only do so where I had it in my power to use very firm pressure. If the position of the tumour was such as not to permit of this, I would most cordially conclude with Mr.

Bell, that no operation ought to be attempted; as under such circumstances it would, to a certainty, accelerate the death of the patient.*

Such is the nature and plan of treatment to be adopted in the arterial anastomosing aneurism, which is more fully described, although, perhaps, not more frequent in its occurrence, than the venous anastomosing aneurism, which, in nine out of ten cases, arises from a nævus maternus. The case which I formerly related, in which the parotid duct was dissected out of the substance of the tumour, furnishes an epitome of all that requires to be said on this subject. I might, no doubt, add other cases to those already described, but these I deem sufficient. They are so decided in their character, that their nature cannot be mistaken; they show the marked difference which exists between the arterial and venous anastomosing aneurism. Different, however, as they are in some points, and unlike as they are in their general features, the practice in both is similar; and their result, if the disease be permitted to run its course, will not be very dissimilar.

The anterior facial vein, begun by the veins of the forehead, is, at the root of the nose, about the diameter of a large crow quill. In its descent it touches the insertion of the orbicularis palpebrarum, and a little lower in the face it is covered by some of the fibres of that muscle. It runs in an

* See Appendix (E.)

oblique line from the angle of the eye to the anterior margin of the masseter muscle. About an inch below the junction of the eye-lids, but considerably nearer to the zygoma, the facial vein generally crosses the infra-orbitar foramen. Between the vein and the infra-orbitar nerve and artery, there is only the thickness of the levator labii superioris muscle interposed. Descending lower, it inclines nearer to the angle of the jaw, and in its course crosses the parotid duct. Along its whole extent the facial vein lies nearer to the ear than the artery, which, however, runs parallel to it, and nearly in contact with it, from a little below the angle of the mouth to the margin of the jaw-bone. Along that part of the face these vessels are covered by the scattered fibres of the platysma myoides.

Opposite to the angle of the mouth the artery inclines forwards, and at the same time mounts gently upwards, running always in a waving course, and often, about this part, forming one or two coils on itself. About midway between the margin of the lower jaw and the mouth, the arteria labialis superficialis is given off. Then in succession, and at a very short distance from each other, the facial artery gives origin to the upper and lower coronary arteries, which are immediately deeply buried in the substance of the lips. To this point the attention of the student must be directed; he ought clearly to

understand that there is only the lining membrane of the lip nearer to the mouth than the coronary vessels. If every surgeon were aware of this fact, fewer mistakes would be committed in dressing the wound after operations performed on the lip.

Many surgeons, knowing no better, believe that pins are passed through the margins of the wound, solely for the purpose of keeping them in contact. With this object in view, they pass them in such a way, that the cut edges are carefully kept in contact in front, but so, that they are allowed to recede from each other behind. But although retention of the divided surfaces in contact, forms a primary consideration in employing pins, still it is not the only one; the operator is really desirous at the same time that he keeps the lips of the wound together, to prevent hæmorrhage from the divided coronary arteries. The latter object can only be accomplished, by passing the pin completely behind the artery between it and the investing membrane of the lip, directly opposite or nearly so, to the point where the vessel is seated. Let an operator do this, and no bleeding can take place, neither can the edges of the wound stand gaping behind; let him pass, however, the pins in front of the artery, and there is no security that bleeding shall not take place; on the contrary, we know that it has frequently happened. Some patients soon after an operation

become faint, and arteries even larger than the coronary vessels of the lips cease to effuse blood. If in this state of the circulation, the surgeon pass the pins in front of the arteries and finish the dressing of the wound, every thing for a time will go on well.

The patient is desired to avoid speaking or spitting, and he is enjoined to swallow whatever flows into his mouth. He obeys his instructions—he revives and as he recovers, blood runs from the divided arteries back into the mouth; it is swallowed, and I have actually known a patient to adhere so pointedly to his directions, as to swallow such a quantity of blood, as occasioned a dreadful sickness and severe vomiting, during which the lips of the wound were burst asunder, and the pins torn from their hold; new pins required to be passed, but the margins of the wound were now ragged and irritated—the cure was retarded, and the patient compelled to suffer much unnecessary pain. By a little attention on the part of the operator all this may be avoided. If fine pins be employed, the mark left by them is very trifling. In cuts about the lips and face, I have repeatedly employed fine sewing needles, which are equally adapted for the purpose, as gold or silver pins. If the points of the needle be carefully cleaned, and as Mr. John Bell properly advises, if they be well oiled, they will be found to enter very smoothly, and with less pain. When they

are to be withdrawn, let them be first rotated and then extracted. To obtain a firmer hold of them, Mr. Bell passes a thread through the eye of each needle.*

After the origin of the upper coronary artery, the continued branch of the facial artery mounts along the side of the nose, more superficial than the levator anguli oris, but covered by the levator labii superioris alæque nasi. It then covers the wing of the nose with its twigs, but is not by this quite exhausted, it still ascends till at the root of the nose it receives additions from the orbit. The slender branch formed by the union of these reaches the forehead, where it is lost in inosculation, with the ophthalmic and temporal arteries.

The lachrymal sac is sunk into the recess between the margin of the orbit and the tendon of the orbicularis palpebrarum. The fibres of that muscle cover the sac, and also the ducts continued from the puncta lachrymalia. The sac, which is of an oblong shape, is placed with the tapering extremity turned downwards. From the most depending part of the sac the nasal duct arises. It opens, by a small rounded mouth into the nostril, about half an inch behind the ascending plate of the jaw-bone, and nearly opposite to the middle of the inferior spongy bone. It is to be recollected, that the margins of this aperture

* Bell on Tumours, page 208.

are membranous and loose, even in some instances puckered, a conformation which sometimes obstructs the entrance of the probe. As the surgeon is often called on to decide regarding the state of the duct, it may be proper to make a few remarks on the mode of examining this canal.

The introduction of the probe is not generally difficult, yet I have seen several foiled in their endeavours to pass it. They attempted by force what they ought to accomplish by artifice; they endeavoured without an acquaintance with the mechanism of the parts, to do what can only be done by one who is familiar with the organization. The position of the orifice of the nasal duct, and the after course of the canal, ought to be carefully studied, because the probe must be adapted to the curve of these parts. It is to be passed by gentle efforts; force must never be employed. I pass the probe along the floor of the nostril, with its concavity directed toward the antrum, and its convexity looking toward the septum of the nose. I carry it on in this course till I feel that its point has passed beyond the ascending plate of the jaw-bone; then I rotate the probe between my fingers, till its point looks upward and outward toward the eye. While the probe is making this turn, it is of consequence that its point be maintained in close contact with the side of the nostril. When this turn is com-

pleted, the handle of the probe is to be gently depressed, while its body and point are elevated. This motion conveys its point into the orifice of the nasal duct, and carries it up into the lachrymal sac.

If the duct be free from obstruction, this is generally readily accomplished; but it must be mentioned, that where the lining membrane of the nostril is preternaturally loose and pendulous, the point of the probe sometimes catches a fold of it, which is carried into the orifice of the duct, where as a valve, it hinders the further progress of the instrument. This cause of obstruction is most easily overcome, by retracing the probe a little, and moving its point slightly away from the side of the nostril.

DESCRIPTION OF PLATE IX.

This sketch illustrates many points connected with the operations performed on the nose. The chief object it is intended to explain, is the situation of the termination of the nasal duct, A, which opens just behind the upper border of the lower spongy bone. The spongy bone has been displaced, to bring into view this opening, which is naturally overhung by the bone. The probe must therefore be insinuated between the nasal process of the superior maxillary bone, and the lower spongy bone, before its point can be conveyed into the duct. These parts are delineated of their natural size, hence it will be seen, that the orifice of the nasal duct is deeper seated than many

imagine. It is from not being aware of this fact, that some surgeons, who attempt to give the turn too soon to the point of the probe, are disappointed in their endeavours to get it into the duct. Let the student examine this sketch, and he will see the spot, where he ought to turn the probe into the orifice of the duct.

Besides showing the place of the nasal duct, this plate also represents the situation of the opening, leading from the nostril into the maxillary sinus. This aperture B, is placed in the middle meatus of the nose. In the natural state, it is completely overhung and concealed from view, by the upper spongy bone. To expose it, considerable liberty has been taken with the spongy bone. It has indeed been broken from its connexions with the æthmoid bone. From the slanting manner in which this duct enters the nose, I conceive that no fluid can pass from the sinus into the nose, neither is it practicable to introduce a probe from the nostril into the antrum. This I would insist on, since it will correct our notions regarding the office of the antrum, and unfold the absurdity of the proposal made by some, of introducing an instrument by the nostril into the maxillary sinus in some of its diseases.

It will, I believe, be found, that in the healthy state of the lining membrane of the antrum, no more fluid is secreted by its vessels, than can be easily re-absorbed by its lymphatics; secretion and absorption balance each other. But sometimes by disease the secretion is increased beyond what the absorbents can remove—hence the fluid accumulates in the antrum; little can naturally pass from the sinus into the nostril, and the greater the quantity collected in the cavity, the less can pass from it, because the opening is so formed, that whenever fluid is collected in considerable quantity in the sinus, it presses the one lip of the opening against the other. Urine might as readily regurgitate from the bladder along the ureter, as fluid pass from the antrum into the nose.

From this mechanism, fluid collected in the antrum cannot escape, and owing to the same cause, when it would be necessary to open a passage for it, we cannot accomplish it, by passing a probe along the natural opening, as in the case of obstructed nasal duct. A new passage must be formed, and we know that it may be most conveniently formed, by extracting one of the grinding teeth, and perforating from its socket into the antrum. Indeed, in many subjects, the fangs of these teeth have little except the lining membrane of the sinus interposed between them and the cavity of the sinus. In every case, the solid substance is so trifling, that no difficulty can be experienced in passing through it.

I would also call the attention of the student to the canal of communication between the frontal sinus and the nostril, which opens at C, into the middle meatus of the nose. A knowledge of the situation of this opening, and the direction of the canal, may be of use to him in cases, where insects have nestled in the sinus. He may, by this information, be enabled to introduce such substances into the sinus, as will destroy them. I have in my possession, a worm dislodged in this way from the frontal sinus.

The opening of the eustachian tube D, ought likewise to be noticed. The form of its trumpet-like orifice, and its position at the root of the pterygoid process of the sphenoid bone, ought to be familiar to the surgeon. This knowledge will enable him to pass a probe from the nostril along the tube, in cases of deafness, supposed to depend on obstruction of this canal. Where the deafness is produced by mucus impacted in the mouth of the tube, one introduction of the probe will generally clear the passage; but where partial adhesion of its sides had taken place, I have generally found a repetition of the operation necessary. The last time I had occasion to pass the probe, I forced three obstructions in the course of the duct.

The passage of the probe along the eustachian tube, is far

from being difficult. The probe, if slightly curved, and if conducted along the floor of the nostril, readily enters the orifice of the duct, and if not too flexible, it as easily follows its course. Where adhesions require to be forced, I employ a silver probe, but where mucus alone has to be removed, a leaden wire about the diameter of a crow-quill will be preferable.

This drawing would also illustrate the operations required, where polypi are lodged in the nose; but as this department has already been very completely treated by Mr. John Bell, I refer to his and other surgical works for information on that subject.

If there be no stricture in the course of the nasal duct, the surgeon will generally succeed in conducting the probe from the nostril into the lachrymal sac, and where the obstruction is slight he may even overcome it. Where the obstruction is firmer, the probe bends before the stricture will yield. Where this has happened, I have made a puncture with a common bleeding lancet into the lachrymal sac, and through that opening have conveyed a straight probe along the duct into the nostril. In this way a very firm stricture may be forced,—to keep the passage pervious is the next object. To accomplish this, I have introduced a curved wire from the nostril along the nasal duct, and healed the puncture over it. This is the same in principle as the French mode of passing a seton from the sac along the nasal duct into the nostril.

Both are equally effectual, but the seton is liable to this objection, that it lays the foundation of a fistulous opening into the lachrymal sac, whereas, if the other plan be adopted in the incipient stage of the obstruction, before the skin covering the sac has become inflamed, the puncture will generally heal kindly, and without leaving any perceptible cicatrix. Where, however, the operation is delayed till the surface has become diseased, the wound will be apt to become sloughy—in the end it will heal by granulation, leaving a polished and sometimes puckered cicatrix. We have, therefore, a great inducement to operate in the early stage of the obstruction, and much to dread if we delay till inflammation has taken place.

I have supposed that an operation will really be useful—that in fact we have it in our power to keep the nasal duct pervious, securing thus a passage for the tears from the lachrymal sac into the nostril. Some doubt the truth of this, while others positively assert, that it is impracticable to preserve the canal patent for any considerable time after the operation. By those who adopt the latter sentiment, the primary object of operation is to destroy the sac, and annihilate the function of the puncta. This practice has, I suspect, been derived from a limited source of observation—it has, perhaps, originated from a supposition that the nature of the disease is similar in every case; but

who that has read Mr. Pott's very excellent tract on fistula lachrymalis, has not been convinced of the fallacy of this notion?

The disease is, indeed, more or less tractable, according to its nature; sometimes it may be removed, and the functions of the sac and duct preserved, at other times these parts must be sacrificed. On this subject I shall not require to enlarge much, I would only observe, that where acute inflammation has produced partial adhesion of the sides of the nasal duct, the decided object of the surgeon ought to be to render it pervious and to retain the duct patent. Failure in accomplishing this, is as frequently referable to the surgeon as to the disease. He never can succeed if the operation be undertaken while the duct is acutely inflamed, nor will he often fulfil his purpose if he delay till ulceration of the sac has taken place.

Failure not only arises from performing the operation during an improper stage of the disease, but is also occasioned by undertaking it in affections of the duct, not removable by operation. This is especially the case where the sac and duct are thickened from chronic inflammation. Where the obstruction is dependent on this species of disease, the inner canthus of the eye is swelled, but is free from pain. By pressing on the tumour, a clear fluid is generally forced back by the puncta, but the

last drops are sometimes turbid, and in the morning the fluid has often a milky tinge. Under such circumstances the opening cannot be kept pervious—not even where a direct communication has been established between the sac and the nose. Here, therefore, it will be preferable to destroy the sac and annihilate the office of the puncta. To attempt to maintain a pervious opening from the sac into the nostril is futile; any endeavour to do so only teazes the patient. Where, however, the nasal duct is merely obstructed by adhesion of its sides produced by acute inflammation, I can confidently affirm, that if the duct be rendered pervious at a proper stage of the disease, it may by care be kept patent.

If we may believe some authors, the consequences arising from the loss of the lachrymal apparatus, are hardly deserving of notice. In their opinion, the tears are evaporated from the surface of the eye-ball, as fast as they are poured from the ducts of the lachrymal gland, hence the puncta are only called on to absorb the superfluous tears, when the action of the gland is increased beyond its usual degree. If the nasal duct be obstructed, it is at this time, and at this time only, that the tears flow over the cheek. It may here be said, if there be not a constant absorption of the tears by the puncta, why is obstruction of the nasal duct productive of so much inconvenience? This has really no force, since the bad effects which are

occasioned by obstruction of the nasal canal, can be otherwise accounted for.

When the nasal duct is strictured, the tears which occasionally are absorbed by the puncta, stagnate in the sac, and are thence a source of irritation. The first effect produced, is an alteration of the mucous secretion from the inner surface of the sac—it is changed to a puriform nature—presently the sac and integuments inflame and ulcerate. The unpleasant effects then, which result from obstruction of the nasal duct, do not arise from the mere interruption to the passage of the tears, but are occasioned by the irritation produced by the detension of the tears in the lachrymal sac. If, therefore, the sac be completely destroyed, we have reason to believe, that an occasional epiphora will alone incommode the patient.

Tumours not unfrequently form over the situation of the lachrymal sac, and are mistaken for the commencement of fistula lachrymalis. Even, however, where these tumours were large, I have never seen the passage of the tears obstructed, nor have I ever experienced any difficulty in passing the probe from the nose upwards, which I would advise to be done in all doubtful cases.

Purmanus, in his Chirurgia Curiosa, alludes to the species of tumour I am at present considering, and he details a case in which he cured the patient. The tumour, which was very large, was seated at the inner canthus of the eye. It was

attached by a neck, and had continued during two years. Purmanus applied a ligature round its root, and renewed it six times. These did not completely destroy the tumour, which he at last removed with the knife. In this way the whole tumour could not be perfectly got away; a portion of it was left behind, which he destroyed by the actual cautery and escharotic powders. It was two months before the wound was cured.*

The tumours which form about this part are generally sacculated, containing melicerous-looking matter, sometimes intermixed with hair, or at other times the cyst is filled with hydatids.† I have generally found it unnecessary to attempt the complete removal of the cyst by the knife. By cutting off the fore part of the sac, and smearing its posterior surface with either potassa or nitrate of silver, the cure is readily enough completed. This, it will be observed, is, in principle, the plan adopted by Purmanus, who only employed the actual in place of the potential cautery.

The application of caustic to the inner surface of that portion of the sac which remains, is essential, because in those tumours there is a morbid action of the sac, which would perpetuate the disease. By many surgeons it has been deemed superfluous to do more than merely evacuate the contents of an incisted tumour, but Mr. Abernethy

* 'Purmanus Chirurgia Curiosa, page 60.

† Wilmer, page 60.

has proved, that in some species more is required. Those sacculated tumours which form about the eye-lids, are of this description. I have seen several cases where the front of the sac had been sliced away, but I never saw an instance in which that practice was effectual. I have seen one when exposed, produce, in an irritable patient, a very considerable degree of constitutional affection—a derangement of the circulating and digestive organs, which one would hardly have expected from the exposure of so limited a surface.

Where the tumour is permitted to burst, if the inner surface of the cyst be not destroyed, it soon assumes an unhealthy aspect, discharging a considerable quantity of fetid matter, and presenting an irregular ragged coat, or ill conditioned fungi sprout from the surface of the sac, which require the utmost vigilance of the surgeon to destroy. In some time longer the parts around become indurated and thickened. Here, as much of the diseased substance as possible is to be removed by the knife, and the rest destroyed by caustic. The caustic is to be applied till the surface assumes a healthy appearance, which will sometimes be after the first, second, or third application. It will hardly be necessary for me to put the student on his guard not to apply too much of the caustic, as the lachrymal sac might be injured, and the cure protracted.

To enter into the consideration of the anatomy of the eye, and an enumeration of its various diseases, followed by a history of the operations performed for their removal, would be altogether foreign to my purpose. I refer those who wish for information on these subjects, to the numerous works on surgery in which they are treated. I cannot, however, omit a few remarks respecting one of the diseases of the eye. I allude to fungus hæmatodes, a disease which was confounded with cancer, till Mr. Wardrop pointed out the difference. His observations clearly establish, that fungus hæmatodes is an affection more frequently met with in young than in old people.

"The first appearances of the fungus hæmatodes, when it attacks the eye, are observable in the posterior chamber. The pupil becomes dilated and immoveable, and, instead of having its natural deep black colour, it has an amber, and, in some cases, a greenish hue; giving to the eye very much that appearance which is observed in the sound eye of the sheep, the cat, and in many of the lower animals. As the progress of the disease advances, the colour becomes more remarkable, and it is soon discovered to be produced from a solid substance which is forming at the bottom of the eye, and gradually approaches the cornea.

"The surface of this substance is generally rugged and unequal, and not unlike what may be supposed to arise from a quantity of effused lymph.

In some cases, red vessels can be seen running across the opaque body; but these are not the vessels which nourish it, but, the ramifications of the central artery of the retina lying above it. During the progress of the disease, the new formed substance gradually fills up the whole of the posterior chamber; its surface advances, so as to arrive at the same plane with the iris, and has the appearance of an amber or brown coloured mass. In this stage of the disease I have known two cases which were mistaken for cataracts, and in one of them an experienced surgeon attempted to couch it. When the disease advances still further, the form of the eye-ball begins to alter, acquiring an irregular knotted appearance; at the same time, the sclerotic coat loses its natural pearly white colour, and becomes of a dark blue or livid hue. The tumour, by its continued growth, finally occupies the whole anterior chamber, and, in some cases, a quantity of purulent matter collects between it and the cornea. At last the cornea ulcerates, and a fungous tumour shoots out from the portion of the diseased substance, contiguous to the ulcerated cornea; and, in other cases, the tumour pushes itself through the sclerotic coat.

" This fungus is very rapid in its growth, and before the disease arrives at a fatal termination, it often acquires a very great bulk. When it is small, it has a good deal the appearance of the softer kinds of polypi which grow from mucous

membranes. It is generally of a dark red or purple colour. Its surface is irregular, and often covered with coagulated blood.

"The substance of this fungus is very readily torn; and when a portion of it is separated, or if it be slightly scratched, it bleeds profusely. In other cases, the tumour is of a firmer texture, and if, as sometimes happens, instead of coming through the cornea, it bursts through the sclerotic coat, it then pushes before it the tunica conjunctiva, and thus derives a mucous covering. When the tumour becomes very large, portions of the most prominent parts begin to lose their vitality, and separate in sloughs, which have a very fetid and offensive smell, and are accompanied with the discharge of an acrid sanies."*

This is a description given by Mr. Wardrop of the fungus hæmatodes in the eye, to the fidelity of which I can, from my own observation, bear testimony in every point, except the sloughing of the tumour, which I have never seen happen, unless where the fungus was tightly girded by the aperture through which it had passed. As, however, a reference to individual cases is more valuable than general description, I shall transcribe the following very interesting case which occurred to myself, and which has been published by Mr. Wardrop, in his work on Fungus Hæmatodes.

* Wardrop on Fungus Hæmatodes, p. 13.

" The patient, Mrs. Scot, was about forty-one years of age. She had always been of a delicate habit of body, and of a sallow complexion, but had never observed any affection of her eyes till two years and a half ago. About that time she began to see less distinctly than usual with her left eye; and on looking at that organ, a milkiness was seen behind the pupil. This opacity of the lens gradually increased during four months, when she became completely blind of that eye. After having been blind for about four months, the eye became very much inflamed, without any obvious cause. By bleeding with leeches, &c. the inflammation abated, but the redness and pain never entirely left the eye. From what I have been able to learn, the opacity of the lens could not be so decidedly ascertained after this attack, owing to the turbidity of the contents of the anterior chamber.

" The further progress of this case was not traced till within the last six months. At the beginning of that period, a tumour began to protrude from the lower side of the sclerotic coat, just behind the attachment of the lucid cornea. When I examined the eye about four months ago, it appeared that the cornea was rather more prominent than usual, and I could neither distinguish with accuracy the iris nor crystalline lens. The appearances impressed me with the idea, that a fungus was lodged behind the cornea, ready to

protrude so soon as the cornea gave way; and in regard to the tumour attached to the lower side of the sclerotic coat, it, at that time, seemed to contain a dark-coloured transparent fluid, which I thought was a part of the aqueous humour, which had escaped from the eye-ball by a rupture of the proper coats of that organ. This cyst was about the size of a musket-ball, and was formed by a distension of that part of the tunica conjunctiva which covers the sclerotic coat; and over the surface of the sac a number of red vessels were seen running in every direction. The pain was intense and lancinating; her sleep was interrupted; and besides being affected with hysteria and pain in the back, she was in some degree hectic.

"When I saw this patient, four months afterwards, matters were in a much worse state than formerly; her health was now completely broken, she had confirmed hectic fever, and was often attacked with paroxysms of histeria. She was much reduced and exceedingly weak, and had not been out of bed for two months. On examining the eye, it was found that the cyst, which formerly was not larger than a musket-ball, had now become as large as a pigeon's egg, forming a solid fungous mass, which could with difficulty be raised, so as to uncover the under eye-lid. The cornea was now flat, and hid beneath the upper eye-lid, and from the body of the large fungus, two small fungi

protruded. Towards the temporal angle of the under eye-lid, there was a hard tumour, situated underneath the integuments, which adhered firmly to the cheek-bone.

"As extirpation of the morbid parts afforded the only hope of recovery, the patient was extremely anxious to have the operation performed, in which we concurred. Assisted by Mr. Wardrop, I performed the operation. As the tumour exterior to the eye-lid was of considerable size, I followed the mode advised by Desault, which is highly conducive to the celerity and ease of extirpation. At the outer canthus of the eye, I separated, by an incision, the palpebræ, for about half an inch from each other. I then grasped the tumour, and dissected back the eyelids from it.

"As I wished to take out all the diseased parts in connexion, I endeavoured to detach them from the lower margin of the orbit, but found to my surprise and regret, that the bone on which they rested was softened and black in colour. I therefore gave up this idea, and proceeded to detach the eye-ball from its connexion, with a common scalpel. While separating it from the roof of the orbit, I was cautious, lest the bone being there soft, the point of the knife might have passed into the brain, and I also kept the scalpel at some distance from the æthmoid bone, to avoid injury of the nasal branch of the ophthalmic artery.

"By the pressure employed in pulling forward the morbid parts, they burst, and a considerable quantity of inky fluid was poured from the opening. I traced the optic nerve to its exit from the skull, and there divided it. Yet even here its medullary substance was as black as ink. I next chisseled away as much as I could of the diseased edge of the orbit, but with little hope that the issue of the operation would be favourable. The diseased state of the optic nerve, and condition of the bone, hardly allowed any reasonable expectation that the patient would ultimately recover.

"We now dressed the orbit. The first point was to check the bleeding from the divided vessels. This was readily done without employing a ligature, which is now seldom or never thought necessary after extirpation of the eye. I laid first a very small piece of lint on the orifice of the artery, and over this applied a plug of rolled up lint, to which a strong thread was fixed. This was made of such a size as nearly to fill the orbit, and it projected to the level of the palpebræ; hence by pressing the eye-lids back on the plug, it was kept steadily in contact with the divided vessel, and hæmorrhage was prevented. By having a thread fixed to the plug, it could be withdrawn so soon as suppuration had loosened it from the part with which it was in contact.

"This woman although much reduced by a hectic fever, and emaciated to a great degree at the

time of the operation soon appeared to recover—she gained flesh and strength—her appetite was restored—the pains in her back and loins left her—she slept well, and was able to walk about. The orbit even discharged good pus in moderate quantity, and was at last filled up with a soft substance, which although dark in colour, skinned over.

"At this stage, when she herself and her friends considered her recovery certain, the weather became cold and damp; the pain soon recurred about her back; she lost her appetite; and was unable to walk from exquisite pains in the loins. After she was confined to bed, she became rapidly worse. The pains increased in severity, insomuch that she could obtain no sleep except from the use of opium. The lower eye-lid was protruded by an elastic fungus, which also began to project from between the palpebræ.

"The disease in the orbit gave her no uneasiness, her whole complaint being seated in the back and loins. The pain there was so excruciating, and occasionally so much increased in intensity, that she screamed from agony. She could neither turn in bed, nor permit herself to be turned, for on every motion she felt as if many sharp instruments were pushed into her back. In this deplorable condition, she lingered for two or three months; the tumour below

the orbit all the while increasing in size, and the pain in the loins in no degree remitting.

"When I saw her three weeks before her death, she was a hideous picture of disease; she was emaciated to the last degree; and the tumour below the orbit was as large as a pullet's egg. Its surface was unequal, the most prominent parts of it were covered with livid integuments, and the swelling conveyed to the fingers the impression as if it contained a fluid. From between the palpebræ a very small fungus protruded, which was covered with a coat of bloody-looking matter. She had, however, little or no pain, either in the orbit or in the head, and the vision of the other eye remained unimpaired.

"From this time to her death she sunk gradually, and the tumour enlarging, became more discoloured on its surface and more irregular, but the fungus between the eye-lid did not alter. About twenty-four hours previous to her death, she became suddenly comatose."

Dissection of the Eye.

As soon as possible after the operation we made a section of the morbid parts, and the following very accurate description of the phenomena was drawn up by Mr. Wardrop: "When dividing the eye-ball and optic nerve, a great quantity of a thick viscid matter, having a very dark brown

colour covered the knife. The eye-ball and tumour, seemed, at first sight, entirely composed of a similar dark coloured matter. This singular looking substance was of the consistence of thick oil paint, though not so clammy nor oleaginous. It soiled the fingers of a dark brown or amber colour. It was readily dissolved in water, and both Mr. Burns and I were struck with its resemblance to the pigmentum nigrum; but we were much at a loss how to account for the formation of such a quantity of that substance. I kept the eye-ball in water for twenty-four hours, so that a great quantity of the black matter was dissolved, leaving the solid parts of the mass more distinct. The cornea appeared sound, and the crystalline lens behind it was of an amber colour.

"The sclerotic coat, at that part which corresponded to the malar portion of the orbit, was ruptured by the tumour, and the torn edges were separated about a quarter of an inch from one another. At the same place the sclerotic coat was split into two layers, a small quantity of the dark coloured substance being interposed between them.

"I could not trace any remains distinctly of the iris, but the choroid coat appeared much more vascular than natural, and at one part it was five or six times its natural thickness. At the place where the sclerotic coat was ruptured, the choroid coat insensibly terminated in a white pulpy substance, composing part of the diseased mass.

"The contents of the eye-ball were chiefly composed of a medullary-looking pulpy substance, variously tinged in different places by the dark brown colouring matter. The tumour projecting beyond the sclerotic coat, appeared to be composed of a similar structure, and from the maceration, numerous white striæ, and in some places spots, appeared throughout the substance of the diseased mass. The tumour, exterior to the eye-ball was covered with a thick mucous membrane, except at the two small prominent parts where it had been ulcerated, and this covering had probably been derived from the tumour pushing before it during its growth, the conjunctiva, which lies over the sclerotic coat.

"The optic nerve was of its natural size, but by examining its section, it was found that the medullary part of it had a black appearance, exactly resembling the tumour in the eye-ball, whilst the membrane was of its natural colour and apparently healthy. I could not detect any remains of the retina.

"One of the lymphatic glands lying by the side of the optic nerve, was changed into a dark coloured substance."

Dissection of the Body.

The liver contained some tumours of a similar texture and appearance with the contents of the

eye-ball. There was also a cyst in the substance of the liver, filled with a great quantity of grumous-looking purulent matter.

Above the kidneys there were similar tumours of pretty considerable size, and the uterus was cartilaginous. The urinary bladder was enormously distended with a turbid bloody-looking fluid, but otherwise in so far as this viscus was examined, its structure appeared healthy.

By making a vertical section of the orbit and fungus it contained, we found the tumour is entirely arising from the antrum maxillare, which was burst open both above and in front. The fungus also projected beyond the lower spongy bone and investing membrane of the nose, into the nostril. The tumour proceeding from the antrum, was on its outer surface, studded over with small knobs of a dark livid colour. Internally, this tumour was made up of a soft substance of an ink colour, intersected by membranous slips, intermixed with a grayish looking substance and ragged fragments of bone. The anterior wall of the antrum was destroyed at the upper part, and the floor of the orbit was elevated, so as merely to have the periosteum and a thin layer of fat between it and the orbitar plate of the frontal bone.

The fungus was exterior to the orbit, although from the destruction of the periosteum attached to the malar portion of the orbit, it was allowed to protrude from between the eye-lids. This

portion of the periosteum was in part destroyed by disease, and in part in consequence of the removal of a carious portion of the bone, when the eye was extirpated.

With regard to the optic nerve, it was expected that its extremity would have been joined and connected with the fungus. Between them, however, the periosteum of the floor of the orbit was interposed. The nerve itself was of its natural size, but of a black colour where it entered the foramen opticum. From this point to near where it had been divided at the extirpation of the eyeball, it was in a similar state; the neurilema had only a slight connexion with the diseased substance of the nerve. At the bottom of the orbit, there was considerable matting and induration of the origin of the muscles. At its termination the nerve formed a sharp point, and here the coats of the nerve adhered to the thickened periosteum of the floor of the orbit, which was pressed in contact with it, by the fungus from the antrum. The optic nerve within the cranium was as thick as the little finger, and as dark in colour as that part of it in the orbit. The junction of the nerves was so much enlarged, that it formed a tumour extending into the third ventricle.

As from the dark colour of the diseased parts, this was a favourable opportunity for ascertaining whether the optic nerves decussate each other, or merely come in contact, I examined carefully the

state of these parts. I found the dark colour extending much beyond the point where the nerves join; but this change of colour was confined to the left side, or to the nerve of the affected eye. On the right side the nerve was of its natural size and colour, and was merely attached to the black diseased parts by cellular shreds. This dissection, therefore, clearly proved that the nerves did not, in this individual, cross each other. I would be, however, inclined to believe, from what I saw, that the optic nerves were joined to each other by interposed nervous substance common to both. The left optic thalamus was of natural structure, but about a third larger than the opposite one. The third and fourth ophthalmic branches of the fifth and sixth pairs were all healthy.

In cases of medullary sarcoma and fungus hæmatodes, the disease is generally propagated by absorption, hence, in the case just related, a gland, in the course of absorption, was found contaminated; but besides, there is in some patients, disease of parts seated at a distance from each other, and having no connexion which is obvious to the anatomist. The present case furnishes an example of this fact, the eye, the antrum, and the liver, were similarly diseased. In each of these parts the black tumour existed, and in each the appearance and nature of the morbid parts were alike.

This case illustrates the formation of fungus in the antrum, which is not an unfrequent occurrence. I have seen the fungus in its incipient stage, when it appeared as a circumscribed effusion of organized lymph from the vessels of a diseased part of the lining membrane. This slowly increases, and in the advanced stage of the disease, the tumour by its pressure, produces absorption of the earthy matter of the bones; the antrum is burst open, the lachrymal duct is compressed, epiphora is produced, ending sometimes in fistula lachrymalis;—the face is deformed, and the lymphatic glands about the angle of the jaw are contaminated. The primary and secondary tumours become incorporated, the integuments ulcerate, fungi sprout from these openings, and the discharge and hectic presently kill the patient.

From the nature of this affection, it will appear that the disease can only be cured in the early stage. If, at that period, we could destroy the vessels passing from the membrane of the antrum into the fungus, it would decay.

In one case treated in London, Dr. Brown informs me, that the surgeon made an opening into the antrum, at the spot where it is generally perforated. This was accomplished without difficulty, since the bones were so softened as to permit of their being easily cut with a scalpel. After he had entered the antrum, he touched the base of the fungus with a heated wire, conducted

through a canula. By two applications of the actual cautery, the size of the tumour was very materially reduced.

Gariot, in his work on the diseases of the mouth, describes fungus of the antrum, and advises, that so soon as the nature of the disease had been detected, we should open the sinus, and destroy the morbid growth by the actual cautery. "Dan cette opération on commence d'abord par détacher la joue de l'os maxillaire, en incisant la membrane interne de la bouche; puis, apres avoir bien dénudé l'os des parties molles qui le recouvrent, on emporte avec un instrument en forme de petite serpette toute la partie inférieure du sinus maxillaire, on est obligé de se servir du ciseau et du maillet pour les parties qui offrent trop de resistance."

Sometimes the hæmorrhage is considerable, while cutting away the base of the antrum, but authors inform us, that they have never seen the bleeding resist the application of the hot wire.

I have seen and dissected three cases of fungus in the antrum, but never have seen any instance in which an operation had been attempted; I can readily believe, however, that if it be sufficiently early had recourse to, the fungus may be destroyed, and the patient cured.

Even in a more advanced stage of the complaint, it has been proposed to perforate the base of the sinus. The object of this practice can

only be as Dr. Thomson remarked, to allow the fungus to form where it will occasion least deformity, and where we can control its growth by ligature, or by the actual cautery. This, however, in the generality of cases, will afford only a temporary palliation, since presently the conglobate glands which have been contaminated, will, by their progress to ulceration and the formation of fungus, destroy the patient.

I saw a very fine illustration of this fact some months ago:—the patient had complained, during a length of time, of deep-seated pain in the cheek, which came afterwards to be accompanied by a feeling of distension. Presently he breathed with constraint through the left nostril, where, by examination, I was informed, a pretty solid tumour had been discovered. It was not, however, till some weeks after that period when I saw the man; then the fungus had widely dilated the nostril from which it projected, so that the neck of the tumour where encircled by the nostril, was considerably thicker than the thumb; that portion which lay exterior to the nostril was expanded, irregular on its surface, of a dark purple colour, and distilled constantly a thin fetid ichor, sometimes mixed with venous blood.

The patient, on account of the constant and severe pain that had injured his look and impaired his strength, was anxious to have the diseased parts removed; but that no one could undertake,

since the antrum and nostril were filled with fungus, and the glands behind the jaw contaminated, forming two tumours, each larger than a turkey's egg, nearly in contact, exquisitely painful, elastic, and irregular on the surface, but still covered by healthy coloured skin.

The man was informed that no operation would now avail; that it only remained for him to abate, if possible, the pain, by the use of opium, and to avoid, as much as he could, irritation of the tumours.

These remarks, it is evident, are only applicable to specific fungi. Where the morbid parts are of the simple nature of polypi, they may, even when large, be destroyed. Such must have been the description of those tumours which have been removed by operation, even after they had, by their pressure, caused absorption of the earthy matter of the bones.*

To the very interesting case of Mrs. Scott, which illustrates so well the nature and termination of fungus hæmatodes† in the orbit and antrum, and which has afforded me an opportunity of pointing out the manner of extirpating the eye and dressing the wound, I shall add another peculiar case, operated on by my brother.

* See Appendix, Note F.

† Dr. Thomson has informed me, that this variety of the disease, where the tumour is nearly black, had been twice noticed by Haller, and particularly described, although under a different name, by Lænnec.

The patient, a young man, began three months before, to observe a fulness below the superciliary ridge toward the temporal side of the orbit. For some time he felt little inconvenience, but, at last, to use his own expression, he saw *gray* or *misty* with that eye. Fifteen days after his vision began to be impaired, the tumour had considerably increased, and now when he viewed an object with both eyes, he saw double. Till within fourteen days, the eye-ball was not materially protruded from the socket. Much about that time it was rapidly forced out, and the pain, which had hitherto been very moderate, was greatly aggravated.

Eight days ago, the protruded eye became highly inflamed. On the accession of this inflammation, vision was still more obscured, and on the following day was, after the application of a cataplasm, entirely lost. Since that time the pain became excessive and stinging, darting back into the head, every part of which felt as if bruised. The tumour, in the mean time, increased with amazing rapidity; the protruded eye-ball was of a dusky red colour, and the tunica conjunctiva covering it was thickened, had a gelatinous appearance, and, in spots, was patched with lymphatic exudation. Behind the lucid cornea, which was now very opaque, a drop of purulent matter was lodged.

To palliate the severity of the pain, a puncture was made through the cornea, but a small quantity of pus only was evacuated. The opening was soon obstructed by a protrusion of the iris, which was coated over with lymph.

This case was viewed as a disease of the lachrymal gland, accompanied with a morbid state of the eye-ball, produced by the pressure of the enlarged gland. On this idea it might have been supposed unnecessary to remove the eye along with the gland; but as vision was now irretrievably lost, and as there was a possibility that the disease might be of a specific nature, it was considered safest to remove it. The operation was performed by my brother in the usual way.

After the operation the patient never felt comfortable; the pain in his head continued, the palpebræ sloughed, intense pains became fixed about the joints, tumours seemingly arising from the bone, formed on each side of the head and on each thigh; the right lachrymal gland began to enlarge, pushing out the eye as on the opposite side; he gradually lost the power of his lower extremities, and the capability of discharging his urine; sloughs formed on the buttocks, his appetite failed, his mind and body were equally unsettled, so that at length he died completely exhausted.

Dissection of the eye-ball and lachrymal gland.

The vitreous humour having, by the pressure, escaped during the operation, the eye was collapsed, when sent to me for examination. The tunica conjunctiva was fleshy and rough on its outer surface, and a considerable quantity of transparent intersticial fluid was effused into the cellular membrane, connecting it to the adjacent parts. It was this disposition which occasioned the gelatinous look of the conjunctiva, previous to the operation. By alcohol this fluid was coagulated.

At the centre the cornea was very thin, but transparent; towards the circumference it was thickened, and a of dirty greenish yellow colour. The sclerotic coat, along its whole extent, was healthy. The choroid coat was of a very deep red colour, and entirely without pigmentum nigrum. At the ligamentum ciliare it terminated in a thick ragged edge, formed by the agglutination of the corpus ciliare, and the thickened and lacerated iris. By the most careful examination, before and after immersion in alcohol, I could discover no vestige of the pulpy part of the retina. A delicate dark red coloured membrane, resembling in texture the tunica arachnoides, lay in the situation of the retina. The optic nerve, exterior to the eye was healthy.

The lachrymal gland, as large as a hen's egg, was flattened, defined by a capsule, was without trace of division into lobules; in density and smoothness it resembled cartilage, and it was of a pale straw colour, inclining slightly, in some lights, to a greenish tinge.

DESCRIPTION OF PLATE VIII.—Fig. 2.

This Figure is intended to illustrate the external appearance of the diseased lachrymal gland, just described. The tumour has pushed the eye from its socket, and protruded the upper palpebræ, disfiguring the face. The lucid cornea is traversed, by the incision made the day before the parts were extirpated, for the purpose of evacuating a little purulent matter which was contained in the anterior chamber of the eye. See page 333.

Dissection of the Body.

The orbit from which the eye had been extirpated, was filled with a substance resembling in texture and colour, the diseased lachrymal gland. It wanted, however, the uniform smoothness of the gland. It was fibrous, and the fibres ran according to the direction of the recti muscles. By removing what remained of the upper eye-lid, and the skin covering the eye-brow, a tumour was brought into view, resembling in texture the con-

tents of the orbit. It was attached to the superciliary ridge of the frontal bone, which, at the point of attachment, was rough and rather swelled. The frontal sinuses were occupied by tumours of a similar texture, which were chiefly connected with the investing membrane of the sinuses. Even where the tumours were not attached, the lining membrane of the sinuses was thickened and altered in its appearance. In every part it had the greenish yellow colour of the contents of the orbit, diversified by spots of a florid colour, produced by the ramification of blood vessels filled with arterial blood.

The æthmoidal and sphenoidal sinuses, and many of the cells connected with the nose, were found containing similar tumours, and much of the schneiderian membrane had assumed the same morbid appearance and colour, but on both sides the investing membrane of the antrum maxillare was free from disease.

In the opposite orbit, the lachrymal gland was found precisely similar in texture to what it had been on the other side, and the periosteum also, on which the gland rested, was changed in its organization. The eye-ball, the fat, the muscles, and the nerves, were still free from disease.

In various spots the dura mater was thickened, and presented the same characters as the other morbid parts, and opposite to each of these points, the internal table of the skull was rough and

more porous than usual. Two similar tumours were attached to the other surface of the skull.

The disease in this case was surely of a specific nature. It was widely extended, and as intractable as fungus hæmatodes. Yet few, from the organization of the diseased parts, will be inclined to believe the disease to have been fungus hæmatodes. It presented none of the characters of that disease. The complaint seemed to me to have been one *sui generis*. The series of parts affected, and the mode of propagation of the disease, were different from what is generally met with in either fungus hæmatodes or medullary sarcoma. In these the neighbouring parts are commonly contaminated, either by actual contact, or by absorption; or in a less obvious way some of the internal viscera are diseased. But I have never heard of an instance, in which the textures affected in this patient, were the seat of medullary sarcoma or fungus hæmatodes; neither have I known any instance, in which the latter disease had advanced so far, without producing contamination of the conglobate glands in the course of absorption.

In this disease, however, the conglobate glands which received the lymphatics from the morbid parts were unaffected. The disease was extended to parts dissimilar in texture, and in so far as we know, entirely unconnected by absorbents. The dura mater, the lining membrane of the

nasal sinuses, the contents of the orbit from which the eye and lachrymal gland had been extirpated, and the lachrymal gland on the opposite side, all presented unequivocal features of the disease. These could not be contaminated by either absorption or continuity; but how the disease was propagated, or what its nature was, are points on which we must confess our ignorance.

Nevertheless, I would not have it supposed that the case is without value. In its progress and termination it is highly interesting; never was an operation undertaken with greater probability of success, and never were diseased parts, to appearance, more completely removed, than in the present instance. Yet it has been seen, that from the first to the last day after the operation, the symptoms were untoward. There was not, as generally there is, after the removal of carcinomatous or spongoid tumours, even a temporary suspension of the complaint; the operation only seemed to have added force to the disease and accelerated its progress.

While the external carotid artery is deeply imbedded in the substance of the parotid gland, it sends off the large internal maxillary artery, which instantly dives behind the ascending plate of the lower jaw bone, and protected by it, sends its branches in safety to all the deep-seated parts about the face.

From the point where the internal maxillary artery is sent off, the temporal artery becomes more superficial, till at last it passes over the zygomatic process of the temporal bone, to be imbedded in the cellular substance which covers the aponeurosis of the temporal muscle. Here it is quite superficial, and here the surgeon generally opens that vessel. I know no operation simpler, nor at the same time, oftener imperfectly executed, than arteriotomy. The causes of failure are worth the investigating, because when understood they are easily avoided. From what I have observed in many instances, I am fully convinced that the surgeon may be foiled in two ways. If he cut the artery completely across, he will only obtain a small quantity of blood, and if he attempt to open the vessel while it is in a state of contraction, the orifice made by the lancet can neither be fair nor large. Let these two facts be kept in remembrance, and disappointment will seldom be experienced in performing this operation.

In opening the temporal artery, I always make firm pressure with the fore finger of the left hand on the artery, a little higher than the point where I intend to open it, and with the thumb of the same hand a little lower. In this way I keep the canal of the vessel distended, by intercepting a quantity of blood. Then with a scalpel I make an incision about half an inch in length, down to

the artery, which I next puncture longitudinally with a lancet. Having removed the pressure with the thumb, eight or ten ounces of blood generally flow from the artery. Then the bleeding begins to flag, and may be fully checked, either by cutting the artery across, or by applying a small compress over it, retained by a proper bandage.*

I have heard some complain, that when they trusted to the first plan, the hæmorrhage was sometimes renewed. This generally depends on the artery having been divided at some distance from the lower angle of the wound. I do not remember ever to have seen the bleeding return, where the vessel had been fairly cut across at the lowest point of the wound, but even if it did, touching it with the oil of turpentine would instantly check the effusion of blood.

In mania, where it is necessary to detract blood, I uniformly open the temporal artery, because where a vein in the arm has been punctured in an unruly patient, the compress is apt to slip aside, and blood be lost. After division of the temporal artery in a high patient, I have repeatedly trusted the person with merely a slip of adhesive plaster over the wound, and have seldom been troubled with a return of hæmorrhage.

* The editor's experience on the subject of securing the patient against hæmorrhage after the operation of arteriotomy has been executed, would induce him to recommend tying the artery in preference to either of the plans stated in the text.—*Ed.*

Some way above the zygoma, the temporal artery, like the other arteries of the head, becomes imbedded in the tough and firm substance of the scalp. This gives a peculiarity of character to wounds of the vessels of the head. When an artery is wounded where lodged among loose and fatty cellular membrane, if external bleeding be prevented, the blood is injected among the cellular meshes, forming a dense dark black placenta-looking mass, from innumerable pores of which blood issues as from a sponge. Where, however, the artery is running among muscles, or is imbedded in the scalp, the blood is collected, forming a circumscribed effusion, which is soon defined by a lymphatic exudation, and under these circumstances, a trumpet-like process of coagulating lymph is sometimes attached to the orifice of the vessel through which the blood has been poured out. This has been observed in the thorax by Morgagni;* in wounded ischiatic artery it has been met with by Dr. Jeffray;† and I have had an opportunity of seeing it in a young woman whose occipital artery had been injured. In a street quarrel she received a blow on the occiput, inflicted by a large angular stone. By the injury she was stunned, so that she fell down and remained in a state of insensibility for a length of time, during which blood continued to

* Morgagni, vol. i. letter 17, art. 14.

† Bell's Principles of Surgery, vol. i.

flow from the wound. When discovered, further bleeding was prevented by a compress and roller.

Some days after the accident, my brother was desired to visit the patient. The integuments round the wound were elevated into a conical tumour, perforated at its apex by the injury done by the sharp corner of the stone. The aperture was ragged, and the surrounding skin was dark-coloured. The tumour neither pulsated nor was diminished by pressure, but it evidently contained blood, which was prevented from escaping by a large coagulum which plugged the orifice.

The patient, although warned of the risk, would not consent to the tumour being opened; she followed her own inclinations in regard even to dressing, which was so clumsily applied, that the coagulum slipped from the wound during the night, a profuse bleeding followed its removal, she fainted, and during the continuance of syncope, a new coagulum formed. This kept its place for a few days, then came away, and as before, its removal was followed by a considerable loss of blood. This discharge and reproduction of the coagulum and consequent bleeding, were continued during two weeks, before her consent could be obtained to cut into the tumour and secure the artery. At last the cyst was laid fully open, the clotted blood cleared away, after which, the florid jet of blood was seen issuing from a trumpet-like orifice; languid indeed, since, from

the frequent repetition of hæmorrhage, she was much reduced, and fainted on every trivial exertion. The pedicle of this trumpet-like expansion was included in a ligature, but it wanted strength to bear the necessary tightening of the thread. It tore across, the bleeding was renewed, but was finally suppressed by passing a ligature round the artery itself.

This case occurred before Mr. John Bell's Principles of Surgery were published, therefore my brother was not at first aware, that this lymphatic expansion was neither possessed of sufficient strength to resist the ligature, nor organization to effect adhesion. It must, of course, be brushed off from the vessel with the handle of the scalpel, and the extremity of the artery itself included in the ligature.

OBSERVATIONS

ON THE

STRUCTURE OF THE NECK

IN THE

YOUNG SUBJECT.

In some points, the differences between the relative situation of the various parts about the neck, in the child and adult, are strongly marked, and of considerable importance.

In a child aged about twelve months, the space from the chin to the sternum measures, when the base of the skull is placed parallel to the horizon, three finger-breadths. At this age the os-hyoides is placed on the same plane with the inferior margin of the lower jaw-bone, and at the distance of two finger-breadths behind the chin, and as yet no projections are formed by the cartilages of the larynx. One finger covers the space from the os-hyoides to the lower margin of the cricoid cartilage; then, allowing half the breadth of the finger for the thyroid gland

itself, which is broader in proportion than in the adult, there will remain, for the distance between the thyroid gland and the sternum, a finger-breadth and a half.

When the head is turned back, five fingers can be introduced between the chin and the chest, and four of these can be laid between the os-hyoides and the sternum. By the stretching of the membrane between the os-hyoides and thyroid cartilage, half a finger-breadth is gained on the distance between that bone and the lower margin of the cricoid cartilage; then deducting, as formerly, half a finger-breadth for the thyroid gland, there are two finger-breadths left between that gland and the sternum.

Generally, at this early period of life, the thymus gland mounts about half an inch above the level of the sternum. It is interposed between the sternum and the left subclavian vein and arteria innominata. The upper margin of the former vessel is parrallel to the highest point of the sternum, while its lower crosses the origins of the arteries rising from the arch of the aorta. The arteria innominata seldom turns to the side of the trachea, lower than a quarter or half an inch above the chest.

The sterno-mastoid muscle and the omo-hyoideus decussate each other two finger-breadths above the clavicle, and three below the angle of the jaw. As in the adult, the common carotid

artery lies just behind the point of intersection of these muscles. The division of the carotid into its external and internal trunks, takes place a finger-breadth above the crossing of the omo-hyoideus and the sterno-mastoid muscles, and consequently two finger-breadths below the angle of the jaw, nearly opposite to the upper margin of the thyroid cartilage. The division, therefore, of the carotid takes place, in regard to the larynx, at precisely the same point in the young and old subject. Yet, when we view the relation of the bifurcation of the carotid to the jaw, in the child and adult, we find a wonderful difference—a difference entirely dependent on the non-evolution of the alveolar processes, and of the teeth. When these are evolved, the margin of the jaw descends, so as to cover, in a great degree, several of the arteries exposed in the young subject.

In the child, the superior thyroid, the lingual, the labial, the inferior pharyngeal, and the occipital arteries, generally arise from the external carotid lower than the digastric muscle, and the latter vessel is proportionably nearer to the portio-dura than in the adult.

In summing up the differences in the relation of the parts between the chin and the chest, in the adult and young subject, we are first led, in the latter, to notice the great distance between the bifurcation of the carotid and the angle of the

jaw, the exposure of the primary branches of the arteries, and the immense space between the jaw and the point of decussation of the omo-hyoideus and the sterno-mastoid muscle.

In the adult, when the head is turned back, the space from the chin to the sternum measures twelve finger-breadths, and the intersection of these muscles is placed four finger-breadths below the angle of the jaw. In the child, whose head is turned back, we can only place five fingers between the chin and the sternum, yet here the decussation of the omo-hyoideus and the sterno-mastoid, is situated three finger-breadths below the jaw. The reason of this difference has already been pointed out. It has been shown, that it is occasioned by the shortness of the ascending branch of the lower jaw bone, and by the narrowness of both maxillæ, previous to the formation of the alveolar processes. About the seventh year the permanent teeth begin to protrude, now the jaws deepen, the angle is carried backward, to make way for the evolution of the grinders, and at the same time the ascending branch of the maxillæ elongates; the parts about the neck assume more and more of the adult arrangement.

In comparing the young subject with the adult, one is naturally struck with the difference in the capacity of the larynx. Neither the external size, nor the canal of the trachea, is, in the child, proportioned to the body. On this subject, Rich-

erand has written a very ingenious and useful memoir, in which the facts are so clearly stated, and the inferences so just, that I prefer transcribing his own words:

" Un jeune homme àgé de quatorze ans, encore impubére, mourut á l'hospice de la charité. En ouvrant le larynx, je fus surpris de sa pititesse, et sur tout du peu d'etendue de la glotte, qui n'avoit que cinq lignes dans son diametre antero-posterieur, et une ligne et demie environ dans le transversal, a l'endroit où elle a le plus de largeur. Une observation qui ne doit point être négligée, c'est que la taille de l'individu étoit elevée, mais que le developpement de ses parties genitales etoit aussi peu avancé que celui de l'organe vocal. J'ai réitéré la meme observation sur des sujets plus éloignes de l'epoque de la puberté; j'ai etendu mes recherches á ceux qui l'avoient dépassée, et j'ai obtenu pour résultat génèral; qu'entre le larynx et la glotte d'un enfant ágé de trois ou de douze années, les differences de grandeur sont tres-peu remarquables, presqu'imperceptibles, et ne peuvent point se mesuré par la stature des individus.

" Qu'a l'epoque de la puberté, l'organe de la voix grossit rapidement, et qu'en moins d'une année l'ouverture de la glotte augmente dans la proportion de 5-10 qu'ainsi son etendue est doublie, soit sous la rapport de sa longeur, soit dans le sens de sa largeur.

"Que ces changemens sont moins prononcés chez la femme, dont la glotte ne s'aggrandit guère que dans la proportion de 5-7; qu'ainsi, sous ce rapport, elle se rapproche de l'enfant, comme le timbre de sa voix l'avoit déjà fait présumer.

"Les differences de grandeur de la glotte rendent raison du danger qui, dans les enfans, accompagne l'angine laryngée; soit en effet une ouverture d'une ligne et demie de largeur, dont les bords se couverent d'une lame albumineuse de trois quarts de ligne d'epaisseur, l'ouverture sera entièrement bouchée. Elle seroit seulement rétrécie; si sa largeur etoit double; un espace suffissant resteroit libre pour le passage de l'air. Cette supposition, dont je me suis aidé pour me rendre plus intelligible, n'est que l'expression de la verité, puis que l'inspection anatomique dèmontre que la glotte a dans les adultes une grandeur double de celle qu'elle presente dans les individus impubères."*

A change is not only produced on the voice, by the evolution of the larynx, but the relative position of some of those parts in the vicinity of the larynx is altered. Richerand has confined his whole attention to the changes produced in the economy of the larynx itself; but these changes, although highly important, are not the only effects springing from the evolution of the

* Recherches sur la Grandeur de la Glotte, par A. Richerand. Memoires de la Société Medicale d'Emulation, tome iii. p. 326.

organ of voice, which interest the practitioner. We must now study the variations in the relative distance between the lower edge of the thyroid gland, and the upper edge of the sternum. When we compare the space between these two points in a child of two years of age, with the space between the same points in the adult, we find that the distance is equally great in both subjects. And I have uniformly found, in a subject just before the age of puberty, an actual measurement of from a quarter to half an inch more between the sternum and the thyroid gland, than in the adult. The cause of these peculiarities is easily explained; it has already been stated, that in the early period of life the larynx is diminutive, in proportion to the other parts of the body, hence it follows, in childhood, that the trachea must be proportionally longer than in the adult.

The position of the cricoid cartilage regulates the situation of the thyroid gland; consequently in children, in whom this cartilage is relatively high placed in the neck, the space between the lower border of that gland and the sternum must be large. As the larynx, however, begins at the age of puberty, to be evolved, the cricoid cartilage is depressed, the thyroid gland descends along with it, and the distance between that gland and the chest is reduced. This fact will explain the reason why, by bending back the head in the

adult, the measurement is chiefly increased between the chin and the thyroid gland; and why, before the evolution of the larynx, the space is principally increased, by bending back the head, between the gland and the chest.

From these facts it may fairly be inferred, that in children, in whom the operation of tracheotomy will chiefly be required, it may be equally safely performed as in the adult. Having mentioned the operation of bronchotomy, it may not be superfluous to enter a little into the consideration of the causes rendering it necessary, and into an inquiry concerning the way in which the operation has been performed.

Formerly this operation was recommended on more trivial occasions than at present. Some advising it to be resorted to whenever the surgeon was foiled in his endeavours to introduce a tube into the larynx, in suspended respiration from drowning, hanging, or noxious exhalation; but in asphyxia from these causes, bronchotomy, in the hands of a skilful surgeon, will seldom, if ever, be required.

This opinion is precisely the reverse of that entertained by Mr. Samuel Cooper, who is an advocate for the employment of bronchotomy, in suspended respiration: "From the manner in which the epiglottis covers the top of the larynx, it is obviously very inconvenient to make any attempt to introduce the muzzle of a pair of bellows into the

rima glottidis, even though the pipe be curved; it is much better to have recourse, at once, to a very safe and simple operation, which consists in making an opening into the front of the trachea, sufficient to admit the pipe of the bellows."

While writing these remarks, the author has, I suppose, overlooked the substitute proposed by Desault, and most happily employed both in France and in this country. That celebrated surgeon was well aware of the difficulty of introducing a pipe from the mouth into the larynx. Before this can be done the epiglottis must be commanded, which is not an easy matter. He found, however, that a tube passed along the right nostril, and properly curved, slipped very readily into the opening of the glottis. Here there was no obstacle afforded by the epiglottis, and no risk of folding it over the top of the larynx, since the point of the tube is behind the line of that valve. This, therefore, is decidedly the mode to be adopted in suspended respiration, unless where the subject is so young, and the rima so small, that a proper sized canula cannot be introduced into the trachea.

As the facility of introducing the curved tube by the nose into the larynx, will entirely depend on the possession of a correct knowledge of the relation of the larynx to the nostril and adjacent parts, I have subjoined a sketch, which will illustrate these points more completely than can be done by any verbal description.

DESCRIPTION OF PLATE X.

While preparing this sketch, the subject was laid on its back, and the left half of the lower jaw was removed, along with that side of the pharynx. By keeping the tongue pulled out of the mouth, the bag of the pharynx is fully expanded, and all the parts are rendered distinct; they are placed in a situation favourable for the introduction of an instrument from the nostril into the larynx.

This view, therefore, will be useful in many respects. It illustrates the relation of the epiglottis and the rima glottidis, to the velum pendulum palati. It shows how easily a flexible tube may be passed from the nostril into the rima, and it at the same time, explains the cause of the difficulty experienced while introducing a pipe from the mouth into the larynx.

The deepness of the epiglottis, and the facility with which that valve is folded over the rima, render the introduction of a tube from the mouth into the larynx, by no means an easy process. It cannot indeed be accomplished, till the finger has been thrust so far back as to get behind the epiglottis. If this be managed, and if that valve be laid flat along the dorsum of the tongue, a curved flexible tube may be conducted along the finger into the larynx. Where the muscular action is completely suspended, the pipe will enter readily enough, but if the laryngeal muscles be still irritable, the rima will be closed so soon as it is touched by the tube; the point of the instrument will slip back into the pharynx, and the stomach will be inflated. All this has frequently happened, and that time which ought to have been employed in another way, has been spent in futile endeavours to get the tube into the windpipe. This delay and discomfiture may be avoided by following the practice of Desault.

This sketch shows, that in the natural condition of the throat,

the epiglottis A, is placed nearer to the mouth, than the line of the posterior face of the velum B. By passing, therefore, the curved flexible tube C along the nose, it presents behind the velum, directly over the rima glottidis, into which it may be directed by a pair of common dressing forceps passed along the mouth. In this sketch, a common flexible catheter has been employed, which may be adapted to any bellows, by merely wrapping folds of linen round its extremity, till it be made of a size just fitted to slip within the nozzle of the bellows. During the hurry, however, and the confusion usually attendant on an accident requiring inflation of the lungs, the surgeon sometimes overlooks such substitutes. Hence I have actually known a person who had fallen into the water, allowed to lie without any attempt having been made to inflate the lungs, till a regular apparatus for that purpose was procured from a distance.

In suspended animation, what is to be done must be done quickly—there is no leisure for deliberation—no time for experiments. A surgeon is liable every hour of his life to be called on to give his assistance, and ought, therefore, to have made up his mind how to act. In regard to inflating the lungs, there cannot remain a doubt about the propriety of passing the tube along the nostril; the structure of the throat is to be our guide, and I will venture to affirm, that he who is familiar with those parts, will, without difficulty, pass a tube from the nose into the windpipe. D the uvula. E the divided body of the hyoid bone. F the bag of the pharynx terminating in G the gullet, which just at its commencement is overhung by H the thyroid gland.

By permitting the tongue to fall fairly back into the mouth, the epiglottis is brought considerably behind the line of the velum. In that situation, an instrument introduced by either the mouth or nose strikes on the valve, and folds it over the glottis. This is,

therefore, the situation in which the parts ought to be placed, when a tube or the probang is to be passed along the œsophagus. If the tube is to be conveyed from the nostril into the gullet, the base of the skull ought to be kept parallel with the horizon; but where we are to pass the probang along the mouth, the head ought to be turned back.

There can only be two inducements to perform the operation of bronchotomy, one to admit air into the lungs, the other to remove foreign substances from the windpipe. Where a solid substance has entered the larynx, it can seldom be expelled—generally an operation is required for its removal. If permitted to remain, even where it is not of such a size as to obstruct to any great degree the breathing, when it first slips into the larynx, its irritation will produce, especially in young subjects, inflammation and death.

In one case which happened in this town, not very long ago, a small horse bean accidentally dropped into the larynx of a young child; immediately her breathing became exceedingly difficult; an incessant cough and general convulsions nearly terminated her life. She continued in an insensible state for half an hour, during which she could not be observed to breathe. Then the breathing became easy, and the face which before

had been inflated and dark coloured, began gradually to resume its usual complexion.

Next day the girl had another attack of difficulty in breathing, which after a violent paroxysm of coughing, abated, but left her in a smart fever. In this way she passed a week, during which she was bled, and her breast was blistered.

It may be proper to mention, that during the whole of this week she was anxious to lie on her back, and also that at the commencement of the attack, she breathed during six hours with a whistling noise. On the ninth day after the accident, she suddenly died during a very severe fit of coughing.

Next day the body was inspected, the larynx found inflamed, coated in part with lymphatic exudation, and containing, just below the rima, a horse bean.

Other cases of a similar nature have come to my knowledge, in which the children died with symptoms of cynanche trachealis, after having at intervals threatening of instant suffocation from the severity of the cough. When, therefore, a foreign substance has slipped back, and the child has immediately had great difficulty in breathing, violent paroxysms of coughing, followed, in a few days by symptoms of inflammation of the larynx, we cannot be enough on our guard—we cannot too sedulously watch the patient, nor can we too soon endeavour to arrest the progress of the inflamma-

tion; I would add, that this cannot be accomplished till after the removal of the foreign substance, by an opening made into the windpipe. Till, however, the opening be made, we seldom can be certain that there really is an extraneous substance lodged in the trachea: we operate, therefore, on a probability; but we have this security, that nothing else, if there be a foreign body in the windpipe, will save the life of the patient. There is, therefore, every reason to induce us to undertake the operation, and none to deter us.

Where a foreign body had unquestionably slipped into the larynx, it was the general opinion, till lately, that the operation of bronchotomy would only be useful in those cases, where the substance was situated above the point where the perforation is to be made. It was universally believed, that if it had descended along the canal of the trachea, it could not be extracted by any opening made into the windpipe. This was at least a plausible speculation; it therefore maintained its ground, till disproved, I believe, by the experiments of Favier. After introducing a pea fairly into the trachea of a dog, he made an opening into the windpipe below the thyroid gland, and found that by the force of the air expelled from the lungs, the pea was thrown out by the wound. This took place as often as the foreign substance was put into the windpipe.

This experiment, uniform in its result, proves that bronchotomy will be equally useful where the extraneous substance has descended into the trachea, as where it has been impacted in the larynx. In the human subject, I have seen a complete corroboration of this fact.

About twelve months ago, during the autumn, a young woman called on me relative to a plum stone which had passed into the trachea. The account which she gave of the accident was, that she had been eating plums two days before—that in a hurry she had incautiously attempted to swallow, at the same time that she was inspiring. She was conscious that a stone had at this instant entered the windpipe, where it excited considerable irritation, and long continued and severe coughing. The latter had greatly abated in the course of a few hours, and at the time I saw her, was only momentarily excited by forcible expiration. I examined her carefully, and ascertained that while she was taking air into the lungs, the foreign substance descended with rapidity along the trachea, to the point where it bifurcates, from which, during extirpation, it was again forced up into the larynx, but could not, by any effort, be projected through the rima. During its ascent and descent, it was productive of a tickling sensation along the course of the trachea.

As she suffered very little inconvenience from its presence, she would not submit to its removal; she was fully persuaded that it would come away as unexpectedly as it had entered. Whether her expectations were ever realized, I never heard; but the fact of the stone changing its position from the larynx to the bifurcation of the trachea, is quite conclusive as to the fact it was meant to corroborate.

In performing the operation of bronchotomy, the perforation is sometimes made into the larynx, and sometimes into the trachea below the thyroid gland. Vicq. D'Azyr first advised the opening to be made between the thyroid and cricoid cartilages, and in this country laryngotomy was afterwards patronized by Mr. Coleman. Notwithstanding the high authority of the celebrated French anatomist, and the opinion of Mr. Coleman, the propriety of laryngotomy in preference to tracheotomy, may be doubted.

In the former we enter at once into the larynx, below the rima glottidis indeed, but still too much in the vicinity of that opening not to afford just ground for apprehension; we excite incessant and very distressing coughing.

If it be really necessary to perform bronchotomy, let it be done, at least in those not arrived at the age of puberty, below the thyroid gland; let us cut into the trachea, by which we shall with less inconvenience to the patient, gain all

the advantage which can be derived from a higher incision. Here I need hardly remark, that the younger the subject, the more easily may tracheotomy be performed, and the less easily laryngotomy.

It may be proper to mention, that in the adult female, the conformation of the neck resembles, in some points, the young subject. In her the larynx is not only smaller in proportion to the body than in the male, but it is also higher placed in the neck.*

When we have resolved on performing tracheotomy, caution is required in the execution of the operation. If considerable care be not employed, we may injure some of the arteries about the root of the neck.

The arteria innominata is in risk in some subjects. I have seen it mounting so high on the fore part of the trachea, as to reach the lower border of the thyroid gland. Even the right carotid artery is not always safe. I am in possession of a cast taken from a boy of twelve years of age, which shows the right carotid artery crossing the trachea in an oblique direction. In this subject that vessel did not reach the lateral part of the trachea, till it had ascended two inches and a quarter above the top of the sternum.

Where both carotid arteries originate from the arteria innominata, there is considerable danger in

* Soemerring de Corporis Humani Fabrica, vol. vi. p. 18.

performing the operation of tracheotomy, for in such cases, the left carotid crosses the trachea pretty high in the neck. Professor Scarpa has seen a specimen of this distribution in a male subject, and I have met with five.

These varieties in the course of the arteries, are worthy of being known and remembered; they will teach the operator to be on his guard, since he can never, *a priori*, ascertain the arrangement of the vessels with any degree of certainty. It will impress on his mind the impropriety of using the knife further, than merely to divide the integuments and fasciæ. If he then clear the trachea with the finger, he will never injure any of the large arteries. When with the finger he has fairly brought the trachea into view, he ought to examine carefully, whether any of the large arteries lie in front of it, and if he discover one, he ought to depress it toward the chest before he penetrates into the windpipe.

In cutting into the trachea, the preferable plan is to cut the rings from below upward, avoiding injury of the thyroid gland. Mr. Cooper seems to cut them from above to below, at least if we may judge from his directions, not to have the incision carried "at all below the first bone of the sternum, lest the subclavian vein should unfortunately be cut."* This is not, however the only risk; it has been seen that there is more danger of injur-

* Cooper's First Lines of the Practice of Surgery, p. 310.

ing one of the large arteries, since these mount higher than the vein. Whether, however, the incision be made in the one way or the other, it appears to be the uniform opinion, that cutting the trachea longitudinally, is preferable to cutting across between the rings.

In a child about six months, the arteria innominata, when on a level with the top of the sternum, and at the distance of an eighth part of an inch from its division into the carotid and subclavian vessels, gave off from its left side, a branch about the size of a crow quill. This ascended along the front of the trachea, for about a quarter of an inch, and there divided into two equal sized branches. From the left branch an artery of some size was sent into the thymus gland, which in this child was very large. Soon after the origin of this thymic branch, the artery divided into six twigs, which, finger-like, embraced the lower margin of the thyroid gland. The other division of the artery sent some twigs into the sterno-hyoid and thyroid muscles, but its chief twigs passed into the thyroid gland. The twigs of this anomalous artery, which just above the chest were few, large, and close to each other, subdivided and receded as they ascended, so that at last they covered not only the whole fore part of the trachea, but even overhung its sides.

From the sternum up to the thyroid gland, there was hardly a single point of the trachea into which

an incision could be made, without dividing some of the pretty large twigs of this vessel. This is not a solitary case—I have met with other three children, in whom there was a similar arrangement of the vessels going to the thyroid gland. It is well to know these facts; not that they afford any objection to the performance of tracheotomy, but to show, that while performing that operation, there may, from the division of the twigs of this vessel, be considerable bleeding.

The two inferior thyroid arteries arise by a common trunk from the right subclavian artery, in a preparation in the possession of my friend Dr. Barclay. In this subject, the vessel creeps up the side of the trachea, lower than the gland, and when it has reached the front of the windpipe it divides into two branches. The right branch runs along the trachea, and the left ascends till within two tracheal rings of the cricoid cartilage. The first lies, as I have been informed, nearly in the line of the small vein which generally covers the trachea, and which, during the operation of tracheotomy, is usually divided.

Haller, when describing the inferior thyroid artery, mentions, "semel rarissimo examplo, a carotide vide natam;"* but as he does not specify the course of the vessel, it is quite uncertain whether it ran, in his case, in such a direction as to come in

* Iconum Anatomicarum Fasciculus xi. p. 18.

the way of the knife, in performing the operation of tracheotomy.

When the operation of bronchotomy is required in the adult, laryngotomy may, by some, be thought preferable to tracheotomy. In the full grown person, the space between the lower edge of the thyroid gland and the sternum, is less than in the child, while the larynx is comparatively much larger. Laryngotomy, therefore, may, in the adult, have some advantages; but tracheotomy is the operation adapted to the mechanism of the throat in childhood. In tracheotomy, the anomalous artery is liable to come in the way, and where it exists it must inevitably be divided. In laryngotomy, we shall more rarely meet with any *aberrant* vessel, although even here they sometimes do occur.

In one subject which I dissected, the ramus thyroideus arteriæ thyroidæ superioris was amazingly large, being considerably bigger than a crow quill, and it likewise ran an uncommon course. This vessel slipped in beneath the omo and sterno-hyoid muscles, running along the line of junction of the hyo-thyroideus, and sterno-thyroideus, till it reached the front of the neck. Then it suddenly turned downward to the thyroid gland, which it touched at the central part. From its course it could not have escaped in laryngotomy; it would have poured its blood into the windpipe.

A large vein is often found running just beneath the fascia, and between the contiguous

edges of the sterno-hyoidei muscles. This vessel, in performing the operation of laryngotomy, would of necessity be divided. This cannot be considered as forming any objection to that operation; it is mentioned, to show that there may be bleeding, and to hint the propriety of securing every vessel which may be injured before cutting into the larynx. By doing so, considerable inconvenience may be avoided.

In a patient of Mr. Harrold's, who had cut into the larynx, between the thyroid and cricoid cartilages, the lips of the wound were brought closely together by sutures. On the fifth day the man died suddenly. A small artery had poured its blood into the windpipe and formed a coagulum there, extending even into the branches of the trachea.*

That the arteries of the thyroid gland, and even the veins, may occasion disagreeable consequences, if divided, in performing the operation of tracheotomy, is incontrovertible: "La glande thyroïde envoie inférieurement à la veine souclaviere gauche, des veines qui, après s'être ramifiées à sa face anterieure, se reunissent en deux troncs dont celui qui est a gauche rampe le plus ordinairement au devant de la trachée-artère, dans l'intervalle qui separe les deux muscles bronchiques, a leur partie inferieure. Ces troncs n'en forment plus qu'n, a l'endroit de leur inser-

* Wilmer's Observations, p. 92—93.

tion, dans le plus grande nombre de sujets. Quelquefois ils restent séparés. Quelquefois aussi l'un d'eux aboutit a la souclaviere gauche, et l'autre a la souclaviere droite. Le gauche peut être interesse dans l'incision du tissu graisseux qui couvre la trachée-artère. Ce canal a lui-meme des vaisseaux qui lui sont propres, et qui peuvent etre ouverts et fournir beaucoup de sang. C'est ce qui est arrivé dans un cas inséré par Hévin dans son memoire sur les corps etrangers arretés dans l'œsophage et dans la trachée-artère, tome premiere des Memoires de l'Acad. de Chirurg. Un soldat Espagnol âgé de vingt-trois ans, etoit pres de perir de suffocation dans une esquinancie. On jugea qu'on ne pouvoit le sauver que par la bronchotomie. La trachée artére ayant été mise a decouvert par une incision longitudinale, ce canal fut ouvert entre deux anneaux cartilagineux; mais le malade n'en eprouva ancun soulagement, parce que le sang y tomboit, et causoit une toux convulsive qui ne permettoit pas de maintenir la cannule en place. Le cas parsut si pressant, que Virgili ce determina à inciser la trachée-artère en long jusqu'au sixieme anneau, apres quoi il fit pencher le malade en devant. Bientôt le sang cessa de couler, et on put mettre dans la plaie une plaque de plomb percée de plusieurs trous, et garnie de deux aîles repliées a peu pres comme celles dont Belloste a fait usage dans le traite-

ment de la plaie du trepan. Des le lendemain, la fievre etoit deminuée et la deglutition plus aisée. Virgili pensa que peutêtre le malade pourroit respirer sans le secours de la plaque, et il l'ôta. Ses esperances ne furent pas trompées. Il ne fut plus question alors que de rapprocher les bords de la plaie et de travailler a sa consolidation que ne tarda que quelques jours a se faire."*

The thyroid gland itself may come in the way of the knife, while performing the operation of tracheotomy. I, in one subject, found the slip of the thyroid gland which crosses the front of the trachea, so broad, that it descended almost to the sternum. This conformation must be remembered, because by injuring the substance of the gland, a very conderable bleeding will be occasioned, and the same bad effects may be produced as result from division of the arteries or veins.

* Medicine Operatoire, par Sabatier, tome ii. page 360.

OBSERVATIONS

ON THE

STRUCTURE OF THE NECK

OF THE

EDENTULOUS SUBJECT.

In an edentulous subject, there are considerable peculiarities in the relation of the parts about the throat.

In some points, an edentulous person bears a resemblance to the young subject, and in others it is similar to the adult, with the head turned back; but it has also a character peculiar to its own period of life.

In the child, from the non-evolution of the jaw and of the teeth, the large vessels at the top of the throat are fully exposed; the parotid gland, from the distance between the angle of the jaw and the anterior edge of the sterno-mastoid muscle is broad, but at the same time short, and from the quantity of adipose matter, there is a fulness and plumpness which is lost when

the fat, instead of being collected exterior to the muscles, is more regularly distributed among their fibres and interstices.

In the perfectly formed adult, the jaws are broad, their circle is wide, and the space between the angle and the mastoid process is contracted. In the adult, therefore, the parotid is larger but of less breath than in the child; the primary branches of the carotid and the styloid process, are, in a great measure, covered by the jaw bone and there is a uniform fulness of all the parts.

In the edentulous subject, there is not only a loss of the teeth, but the alveolar processes are likewise absorbed. By the falling out of the teeth and the loss of the alveolar processes, the distance between the palatine plate of the upper jaw bone and the chin is much reduced; again the infantile conformation would exist, were it not from the length of the lower jaw.

When the mouth is closed, the chin is raised and projected forward, and the angle of the jaw is removed from the mastoid process; the space between these points is greatly increased, the breadth of the parotid gland is augmented, a hollowness is formed behind the jaw, the whole of the styloid process is uncovered, and the large vessels and nerves about the top of the throat are exposed.

By bringing the jaws into contact, the mylo-hyoideus, and the anterior belly of the digastric, are, even when the base of the skull is placed parallel to the horizon, put on the stretch, consequently the submaxillary gland is exposed; it is brought almost completely below the margin of the jaw bone. In this respect, therefore, the edentulous subject resembles the adult with the head turned back; in other points, however, they are very dissimilar. In the edentulous person, the peculiarities are produced by alterations in the conformation of the jaw, chiefly by the loss of the teeth and the decay of the alveolar processes.

From the elevation of the angle of the edentulous jaw, the point where the sterno-mastoid and omo-hyoid muscles intersect each other, is relatively to the angle of the jaw, as low seated as in the young subject. In the perfect adult it has been shown, that a line drawn from the point of decussation of the omo-hyoideus and sterno-mastoid muscles, to the angle of the jaw, follows nearly the course of all that part of the common carotid artery above that spot, and likewise of a considerable portion of the external carotid. In the edentulous body, a line drawn in the same direction, is very far from following the course of the artery; it turns forward from the vessel, with which it forms an acute angle.

APPENDIX.

Note A.—p. 71.

A case similar in its nature, but attended with somewhat different symptoms, came under my own observation, in the year 1817. I have already published this case in the tenth number of the American Medical Recorder, p. 194, but as I consider it one of great interest, and one which proves most forcibly the lesson taught in the text,—the difficulty of ascertaining before death the exact nature of such affections, I shall offer no apology for transcribing it.

Mr. J. M'C. was, at the period of his death, in the forty-seventh year of his age. He was a man of superior talents and of remarkable activity, and, until six months previous to his dissolution, had enjoyed excellent and uninterrupted good health. In the autumn of the year 1816, he was attacked with a severe, and as he and his physicians thought, rheumatic pain, in the lower part of his neck. It was continued, nor did all the local and general remedies used, operate towards its allevi-

ation. The neck was again and again examined; but as nothing could be there discovered amiss, the first opinion of the medical gentlemen was retained, and the rheumatic plan of treatment persevered in until the patient's death.

Although suffering severely from the local pain, Mr. M'C. did not confine himself constantly to his house; but was actively engaged during a great part of the period of illness in arranging his affairs, which from commercial convulsions, had become embarrassed.

One evening, in the month of April, 1817, he retired to bed in his usual state of health, and was discovered next morning in a state of insensibility, arising from apoplexy. Under this attack he remained until the evening, when he recovered his sensibility; but after conversing with his friends rationally for about an hour and a half, the coma returned, and terminated his life early the following morning. I was not consulted as a medical man during Mr. M'C.'s illness, but was requested by a friend, one of the physicians who had attended him, to conduct the dissection.

The apoplexy being the most prominent feature in the case, the head was first examined. When the convolutions of the brain were exposed by the removal of the scull-cap and dura mater, the cerebral veins were observed very much distended with blood. But although the dissection of the brain was conducted with the utmost care and

attention, neither sanguineous nor serous effusion could be discovered in the ventricles or substance of that organ. The general and very great turgescence of the cerebral vessels was, however, quite sufficient to account for the coma.

On opening the chest, the nature of the original disease was at once exposed. There arose from above the arch of the aorta a large tumour, which, projecting sternally, adhered firmly to the spinal aspect of the sternum. Upon separating this connexion we discovered that the tumour was formed by an aneurism of the arteria innominata, and that the sternum, where pressed on, had become carious. The transverse vein formed by the union of the left subclavian and jugular veins, presented a very uncommon appearance. It had more the character of a ligamentous cord than of a distended vessel; and when opened it was found filled with coagulable lymph, which completely obliterated its cavity. Being curious to ascertain the cause of this, I traced it carefully downwards towards the right auricle. Upon arriving at the sternal aspect of the aneurismal tumour, the vein terminated, that portion of it which crossed the tumour having from pressure become obliterated. The tumour measured four inches in its transverse diameter, and three in its longitudinal. The depth of the sac from its spinal to its sternal surface was two inches and three quarters. From its situation it completely covered and concealed the

trachea and gullet. The whole length of the arteria innominata was involved in it, and those arteries into which that vessel naturally divides, arose separately, as independent branches from the spinal aspect of the aneurismal sac. Both the superior and inferior thyroidean veins were enlarged and distended with blood; they appeared to be the channels through which the venous blood, from the left superior extremity, and left side of the head and neck, was conveyed to the pulmonic auricle.

We are naturally struck, from the consideration of this case, with the fact, that such a derangement could exist in the arterial system, and yet remain undiscovered until after the patient's death. It is a very rare occurrence even for aneurisms of the arch of the aorta to remain unsuspected. We cannot, it is true, in many instances, give a positive assurance of their existence; but the palpitations of the heart, the intermissions of the pulse, and those painful indescribable pectoral sensations which are their usual attendants, leave generally, in the mind of the intelligent practitioner, little doubt of their presence.

Another fact in the history which strikes us as curious, is, that although the aneurismal tumour was situated immediately before the trachea and œsophagus, although it had from its enlargement obliterated the transverse vein, and from its pressure rendered the upper bone of the sternum

carious, still that no symptom of its having pressed either on the aspera arteria or gullet, was manifested during the life of the patient. Writers on aortic aneurisms inform us, that when these tumours are situated on the right side, they produce dysphagia, when on the left, dyspnœa. Yet in this case neither of these symptoms were present. Can it be supposed that the enlargement of the tumour was directed towards the sternum by the force of the circulation? That the blood coagulating upon the anterior inner surface of the sac, and remaining fluid on the posterior, the current of the circulation behind directed the pressure from the trachea and gullet, and directed it towards the sternum?

I have in my possession the morbid parts of both Mr. Burns' patient, and likewise those which were taken from the above case. In every point of structure they bear a striking resemblance to each other. Indeed, this is so remarkable that it would be difficult to distinguish the one preparation from the other. In the record of their symptoms, it will, however, be observed, that they seemed to be very different. A pulsation situated above the clavicle, was in Mr. Burns' patient the symptom which chiefly occupied the attention of the medical attendants. In the case where I conducted the dissection, this symptom escaped altogether the observation of the physicians. They were men of the first consideration, yet,

they declared that "*no pulsation was to be discovered.*" I must confess I am sceptical on this subject, the thyroid margin of the tumour was in contact with the sternal margin of the thyroid gland, and consequently, the pulsation must have been observed, had the examination been conducted with attention. The probability is, that the symptom of rheumatism was the only one to which the minds of the physicians in attendance was directed.

It is worthy of remark, that the rheumatic symptom which was so prominent in Mr. M'C.'s case, was also present in Mr. Burns' patient. Rheumatic pains, in such a situation, so local, so obstinate, and so severe, are always to be viewed with suspicion. That rheumatism does frequently occur in this situation, cannot be doubted; but that a pain of the same character is almost a never failing attendant on aneurism of the arch of the aorta and its great vessels, should never be forgotten. The rheumatic pain may and probably will be removed by medical treatment, the aneurismal never can. Let this fact be recollected and we may be assisted in forming a just prognosis in cases similar to those we have recorded.

Another character in which the cases resembled each other, was the disposition to apoplexy. In Mr. Burns' patient, there were "vertigo, failure of the sight, a turgescence of the veins of

the head and neck." In my own case the disease terminated in apoplexy.

From these observations it will appear, that the difference in the symptoms of the two cases was more apparent than real, and demonstrates the necessity of examining both local and general symptoms before we form an opinion as to the nature of obscure diseases.

Note B.—p. 73.

That a ligature may be passed around the arteria innominata, so as to stop the circulation of blood through it, without materially affecting the functions of the brain or the actions of the right superior extremity, is a question which rests no longer on speculation. Dr. Mott, Professor of Surgery in the University of New York, has actually performed the operation on the living subject. The great interest of this case will be a sufficient apology for the very long extract which I make from it.

"Since the publication of Allan Burns' invaluable work on the Surgical Anatomy of the Head and Neck, I have been in the habit of showing, in my surgical lectures, the practicability of securing in a ligature the arteria innominata; and I

have had no hesitation in remarking that it was my opinion, that this artery might be taken up for some condition of aneurisms; and that a surgeon, with a steady hand and a correct knowledge of the parts, would be justified in doing it. I felt myself warranted in this, from the singular success which this celebrated anatomist informs us attended his injections, and from my own investigations of this subject. If the right arm, right side of the head and neck, can be filled with injection, after interrupting its passage through the innominata, as we believe they can, who can doubt the possibility of the blood to find its way there also, as it will pass through thousands of channels, which art could not penetrate even by the finest injections? The well known anastomoses of arteries, and the great resources of the system in cases of aneurism, encouraged me to believe, that this operation might be performed with reasonable prospects of success. With all this sanction, and the analogy of the other great operations for aneurism, I could not for a moment hesitate in recommending and performing the operation.

"The following operation, as the steps of it will show, was performed with the two-fold intention: 1st, of tying the subclavian artery before it passes through the scaleni muscles, if it should be found in a fit state; and 2dly, to tie the arteria innominata in case the former should be diseased

or too much encroached upon by the aneurismal tumour.

"Michael Bateman, aged fifty-seven years, was born in Salem, Massachusetts, and by occupation a seaman. He was admitted into the New York hospital on the first of March, 1818, for a catarrhal affection, having at the same time his right arm and shoulder much swollen. At the time of his admission the catarrh being thought the most considerable disease of the two, he was received as a medical patient, and placed under the care of the physician then in attendance. During the three first weeks of his residence in the house, the cattarrh had greatly yielded to the remedies prescribed. The inflammation, which had produced an enlargement of the whole superior extremity, extending itself to the muscles of the neck on the right side, was also gradually subsiding.

"A tumefaction, however, situated above and posterior to the clavicle, at first involved in the general swelling, and not to be distinguished from it, began to show itself. This resisted the remedies which were effectual in relieving the other, and became more distinct and circumscribed as the latter subsided; at length assuming the form of an irregular tumour.

"The history which he gave of the case is as follows: He said, about a week before he entered the hospital, while at work on ship-board, his feet ac-

cidentally slipped from under him, and he fell upon his right arm, shoulder, and the back part of his head; that he felt but little inconvenience from the fall, and after a short time returned to his duty. Two days subsequent to this, however, he felt pain in the shoulder, and the succeeding night was unable to lie upon it in bed. The whole arm and shoulder then began to swell, and became so painful that he was unable any longer to perform his duty as a seaman. The ship having arrived in New York, he was admitted into the hospital.

"For some time after the general swelling had subsided, leaving the tumour distinct and circumscribed, no circumstance occurred which gave rise to a suspicion of its being aneurismal. The enlargement was thought to be a common indolent tumour, and was repeatedly blistered, with a view to discuss it. The tumour gradually diminished under this treatment; though a considerable time elapsed before any very striking change took place.

"At length a faint and obscure pulsation was perceived; still it was a matter of doubt whether the tumour was aneurismal, or whether the pulsatory motion was communicated to it by the subclavian artery, immediately over which it was situated. From its firm unyielding nature upon pressure, the latter was considered as the most probable, and the blisters were continued as before. During the whole of this time the patient had worn

his arm in a sling, the motions of it being very limited, and always attended with pain.

"The patient remained in this state for several days, without any marked change either in his feelings, or in the appearance of the tumour.

"On the 3d of May, at six o'clock in the afternoon, the patient complained that he "felt something give way in the tumour," that his shoulder was very painful, and that he was able to raise it only a few inches from his side. The tumour at this time suddenly increased about one third, and a pulsation was distinctly perceptible. Its most prominent part was below the clavicle; at which place the pulsation was most distinct. The portion above the clavicle was also much enlarged; it still, however, had its usual firmness, except in one point near its centre.

"May 4th.—The tumour is evidently increased, that portion of it more particularly which is below the clavicle; it is not as firm and resisting as it has been. Pulsation is not so distinct as yesterday, but appears to be more diffused.

"He was this day transferred to the surgical side of the house, and became my patient. The cough having become comparatively slight, the tumour appeared to be the most urgent disease, and, in my opinion, to call for prompt attention. The arm is now perfectly useless, and any motion at the shoulder joint gives him severe pain. The patient is naturally of a spare habit, and from the

nature of the disease, and the confinement to which he has been subjected, has become much reduced in strength.

"May 5th and 6th.—The tumour is still progressing, and the pain in the shoulder is also more severe. During the three last days his medicines have been discontinued, except that he is allowed to rub the parts about the clavicle with volatile liniment.

"On the seventh I directed a consultation of my colleagues to be called, consisting of Drs. Post, Kissam and Stevens. I now stated to them that I wished to perform an operation which would enable me to pass a ligature around the subclavian artery, before it passes through the scaleni muscles, or the arteria innominata, if the size of the tumour should prevent the accomplishment of the former. This I was permitted to do, provided the patient should assent, after a candid and fair representation was made to him of the probable termination of his disease; and that the operation, though uncertain, gave him some chance, and, as we thought, the only one of his life.

"Dr. Post, at my request, communicated with him privately on this subject, and after a full explanation of the nature of the case, my patient requested to have any operation performed which promised him a chance for his life, saying, that in his present case he was truly wretched.

"May 8th, 9th, and 10th.—The tumour is acknowledged by all to be increasing, and it is thought proper not to defer the operation any longer. I therefore requested that preparation be made for performing it to-morrow.

"It is difficult to give an idea of the size of a tumour so irregular in its form, and so peculiarly situated. A thread passed over it, from the lower part of that portion of it which is below the clavicle, extending upward obliquely across the clavicle toward the back of the neck, will measure five and a quarter inches.—Another crossing this at right angles one inch above the clavicle, will measure four inches; two and a half inches of the thread are on the sternal side of the former, and one and a half on the acromial. It rises fully an inch above the clavicle, which, added to the depression below the clavicle on the opposite shoulder, will make the size of the swelling above the natural surface about two inches.

"May 11th.—One hour before the time assigned for the operation, the patient appeared perfectly composed, and apparently pleased with the idea that the operation afforded him a prospect of some relief. He was directed to take of tinct. opii. seventy drops.

"No difference can be perceived in the pulsation of the arteries in the two extremities; his

pulses are uniform and regular, each beating sixty-nine in a minute.

"He was placed upon a table of the ordinary height, in a recumbent posture, a little inclining to the left side, so that the light fell obliquely upon the upper part of the thorax and neck. Seating myself on a bench of a convenient height, I commenced my incision upon the tumour, just above the clavicle, and carried it close to this bone and the upper end of the sternum; and terminated it immediately over the trachea; making it in extent about three inches. Another incision about the same length, extended from the termination of the first along the inner edge of the sterno-cleido-mastoid muscle. The integuments were then dissected from the platysma myoides, beginning at the lower angle of the incisions, and turned over upon the tumour and side of the neck.

"Cutting through the platysma myoides, I cautiously divided the sternal part of the mastoid-muscle, in the direction of the first incision, and as much of the clavicular portion as the size of the swelling would permit, and reflected it over upon the tumour. The internal jugular vein was encroached upon by the swelling, which made this part of the operation of the utmost delicacy, from the morbid adhesion of that part of the clavicular portion of the muscle to it, which was detached. I separated this portion of the muscle to as great an extent, however, as the case would

possibly allow, to make room for the subsequent steps of the operation; only a part of the vein was exposed. The sterno-hyoid muscle was next divided, and then the sterno-thyroid, and turned upon the opposite side of the wound over the trachea. This exposed the sheath containing the carotid artery, par vagum, and internal jugular vein. A little above the sternum, I exposed the carotid artery, and separated the par vagum from it; then drawing the nerve and vein to the outside, and the artery towards the trachea, I readily laid bare the subclavian about half an inch from its origin. In doing this, the handle of a scalpel was principally used, nothing more being required but to separate the cellular membrane, as it covers the artery. I judged it would be very imprudent to introduce a common scalpel into so narrow and deep a wound, especially as it would be placed between two such important vessels or parts, as the carotid and par vagum, and where the least motion of the patient might cause a wound of one or the other of them. The proper instrument, in my opinion, for this part of the operation, is a knife, the size of a small scalpel, with a rounded point, and cutting only at the extremity; this was used, and found to be very convenient for this stage of the operation. It can be introduced into a deep and narrow wound, among important parts, without the hazard of dividing any but such as are intended to be cut.

"On arriving at the subclavian artery, it appeared to be considerably larger than common, and of an unhealthy colour; and when I exposed it to the extent of about a half an inch from its origin, which was all that the tumour would permit, to ascertain this circumstance more satisfactorily, my friends concurred with me in opinion, that it would be highly injudicious to pass a ligature around it. The close contiguity of the tumour would of itself have been a sufficient objection to the application of the ligature in this situation, independent of the apparently altered state of the artery.

"While separating the cellular substance from the lower surface of the artery, with the smooth handle of an ivory scalpel, a branch of an artery was lacerated, which yielded for a few minutes a very smart hæmorrhage, so as to fill the wound perhaps six or eight times. It was about half an inch distant from the *innominata*, and from the stream emitted, was about the size of a crow-quill. It stopped with a little pressure. I can scarcely believe this to have been the internal mammary, from the hæmorrhage ceasing so quickly; though, from its situation, it would appear so; and if from some irregularity it were not the superior intercostal, it must have proceeded from an anomalous branch.

"With this appearance of disease in the subclavian artery, it only remained for me either to

pass the ligature around the arteria innominata, or abandon my patient. Although I very well knew, that this artery had never been taken up for any condition of aneurisms, or ever performed as a surgical operation, yet with the approbation of my friends, and reposing great confidence in the resources of the system, when aided by the noblest efforts of scientific surgery, I resolved upon the operation.

"The bifurcation of the innominata being now in view, it only remained to prosecute the dissection a little lower behind the sternum. This was done mostly with the round edged knife, taking care to keep directly over and along the upper surface of the artery. After fairly denuding the artery upon its upper surface, I very cautiously, with the handle of a scalpel, separated the cellular substance from the sides of it, so as to avoid wounding the pleura. A round silken ligature was now readily passed around it, and the artery was tied about half an inch below the bifurcation. The recurrent and phrenic nerves were not disturbed in this part of the operation.

"In no instance did I ever view the countenance of man with more fluctuations of hope and fear, than in drawing the ligature upon this artery. To intercept suddenly one fourth of the quantity of blood, so near to the heart, without producing some unpleasant effect, no surgeon, *a priori*, would have believed possible. I there-

fore drew the ligature gradually, and with my eyes fixed upon his face, I was determined to remove it instantly if any alarming symptoms had appeared. But, instead of this, when he showed no change of feature or agitation of body, my gratification was of the highest kind.

"Dr. Post now asked him if he felt any unpleasant sensation about his head, breast, or arm, or felt any way different from common, to which he replied, that he did not.

"Immediately after the ligature was drawn tight, the tumour was reduced in size about one third, and the course of the clavicle could be distinctly felt.

"The parts were now brought into coaptation, and the integuments drawn together by three interrupted sutures and straps of adhesive plaster; a little lint and additional straps completed the dressing. Three small arteries were tied in the course of the operation: the first was under the sternum, and divided with the sternal part of the mastoid muscle, and from its course may have been a branch of the internal mammary reflected upwards; the second, in raising the inner edge of the mastoid muscle, about the upper angle of the longitudinal incision, and must have been the most descending branch of the superior thyroid; and the third, was a branch of the inferior thyroid, and cut while raising the sterno thyroid muscle. The patient lost perhaps from

two to four ounces of blood, most of which came from the ruptured branch of the subclavian. The operation occupied about one hour.

"Ten minutes after the operation the pulse is regular, and not the least variation can be perceived; it beats sixty-nine strokes in a minute; the patient says he is perfectly comfortable, and has no new or unnatural sensation, except a little stiffness of the muscles of the neck, which he thinks is owing to the position in which his head was placed during the operation; the temperature of the right arm is a little cooler than the left; his breathing has not been the least affected by the operation, but is perfectly free and natural.

"Two o'clock, p. m.—Patient expresses a desire to eat, and is directed a little thin soup and bread; the temperature of both arms is very nearly the same; breathing perfectly natural; pulse as before.

"Three o'clock, p. m.—There is still a trifling difference in the temperature of the two arms; ordered the right to be wrapped in cotton wadding; not the least unpleasant symptom has as yet made its appearance.

"Six o'clock, p. m.—Complains of a little pain in his head, not more on one side, however, than the other; describes it as a common head-ache: the pain of the shoulder and arm much less than before the operation: no difference can now be per-

ceived in the temperature of the two arms; pulse a little accelerated, and perhaps a little full.

"Nine. p. m.—Patient complains of head-ache; skin is rather hotter than natural, pulse strong and full, and beats seventy-five in a minute; the carotid on the left side of the neck is observed to be much dilated and in strong action; tongue moist and clean.

"Half past nine, p. m.—Symptoms continuing the same, directed him to be bled from the left arm to sixteen ounces. After bleeding the pulse fell seven beats, and was less full. Complains of some thirst; let him drink common tea.

"Twelve, p. m.—Patient has slept a little; is free from pain; pulse full and less frequent, beats sixty; skin moist and of a natural temperature."

From the daily reports given of the case, it appears that no disagreeable symptom occurred until the twenty-third day after the operation. Indeed, the patient felt so well on the twentieth day, that he was enabled to walk down two pair of stairs and several times across the yard. The report of the twenty-third day is as follows:

"*Twenty-third day.*—A few minutes before the hour of visiting to-day, a message was brought that the patient was bleeding from the wound. The dressings were immediately torn off, and dry lint crowded into the wound, and slight pressure applied for a few minutes, when the hæmorrhage ceased. The patient lost at this time, perhaps, about

twenty-four ounces of blood, and was very much prostrated. Pulsation ceased in the radial artery of the left arm, and the countenance, gasping, and convulsive throes of the patient, threatened immediate dissolution; all present apprehended the instant death of the patient. The first impression was, that the trunk of the arteria innominata had given way. The conjecture afterwards was, that the subclavian artery, from the diseased state of it, had not united by adhesion, and that the fluid blood from the tumour had regurgitated through its ulcerated coats. This appeared to be the most probable, both from the suddenness with which the blood ceased flowing, and the cause the patient assigned for the hæmorrhage. He says, that he felt weary of lying on his left side and back; that he had just turned on the right, which he had not done before since the operation, agreeably to my request. At the instant of turning over, something arrested his attention, which cause him to turn his head to the opposite side suddenly, and he felt the gush of blood from the wound.

"He was directed some wine and water frequently, which soon revived the circulation. The wound was dressed with dry lint and a compress. Pulse as frequent as natural, but very small and soft: he appears very languid, and complains of a numbness and painful sensation in his hands; says also that his back aches. During the last

twenty-four hours he has taken a pint and a half of Madeira wine: he also took occasionally some egg and wine, which was immediately rejected from the stomach.

"Nine, p. m.—Patient has lost his appetite, and appears considerably depressed; circulation very languid in the right arm; temperature of it is a little less than the left: directed a hot brick to be wrapped in flannel, and placed close to the arm. For a profuse perspiration, which he has been in for the last three hours, he was ordered to be bathed with cold rum.

"*Twenty-fourth day*, six, a. m.—Slept the greater part of the night, and feels comfortable; is still languid, and has no disposition to eat any thing; says he feels sick, and once last evening vomited after drinking some wine and water.

"Wound looks exceedingly pale, and the discharge is thin and fœtid, for which the carbon and yest dressings were applied. He has vomited several times to-day, and has some considerable difficulty in swallowing, and complains of a soreness in the wound upon pressure.

"Nine, p. m.—Dressings removed; wound very pale; right arm of the natural temperature; feels occasionally a little numbness in the hand; has taken very little nourishment during the day; pulse natural as to frequency, but small and feeble; a few minutes after dressing the wound, information was brought that hæmorhage had

ensued, and before it could be commanded, he probably lost four ounces of blood. For his restlessness and pain in the bones he was ordered two grains of opium.

"*Twenty-fifth day.*—Has rested well during the night, and is perhaps a little better this morning. The repeated hæmorrhages have debilitated him exceedingly, and from the irritable state of the stomach he can take only a very little nourishment. In the morning he was directed the effervescing draught, to be repeated every two hours; this allayed the irritability of his stomach, and enabled him to take a little breakfast.

"His countenance has altered since the first bleeding surprisingly, his eyes are now heavy, and for the most part fixed; his cheeks are sunken, and an universal palor has spread itself over his countenance; and from every appearance, a short time will terminate his existence. He has not vomitted since early in the morning; is advised to take a little soup, and to drink freely of wine and water; dressings were renewed at three o'clock, p. m. shortly after which the patient again bled, but not to exceed, however, an ounce. He was dressed with dry lint as usual.

"Eleven, p. m.—Patient has not as yet had any sound sleep, is restless and apparently distressed, although he says he feels no pain; breathing is attended with some difficulty; his hands and legs are continually in motion; pulse small and feeble.

"*Twenty sixth day*, six, a. m.—Patient has not rested well; is occasionally falling into little slumbers, but is awakened by the least motion: Pulse small and feeble; respiration somewhat laboured; appears to be sinking; seems disinclined to take any thing; legs and arms constantly in motion.

"Eleven, a. m.—More feeble than before; has been forced to take a little chocolate; is evidently sinking; wound was dressed, but there was no secretion of pus in it; countenance of the patient foretells his approaching dissolution.

"Six, p. m.—Is extremely low; respiration very laborious; is not able to articulate: for the last three hours there has not been such continued throwing of the legs and arms about the bed: he lays in a state of insensibility; *temperature of the two arms the same to the last.* My pupil, Mr. Abraham I. Duryee, the house surgeon, (to whom I am indebted for the correct reports, and the most unwearied attention to this case, and whose ingenious application of means for the recovery of many of my patients, will long be held by them in grateful remembrance,) having for a few minutes left the patient, he was sent for immediately, as there was another bleeding from the wound, by which he lost probably eight ounces of blood: during the whole time he did not manifest the least appearance of consciousness, nor was the least motion perceptible, except that

neccessary for respiration and circulation: the hæmorrhage was stopped with lint after removing the former dressings; respiration is now performed with the utmost difficulty, and the patient appears as if every respiration would be the last: he expired at half past six in the afternoon: the temperature of the right arm after death, appeared by the touch to be the same as the left. It was as natural and uniform as other parts of the body,

Examination of the Body.

"About eighteen hours after death, I opened his body; there was considerable emaciation, and the surface of the wound was of a dark brown colour, and fœtid; the wound was perhaps about one third of its original size; it had been enlarged by the pressure of lint into it, and other means to arrest from time to time the hæmorrhage: the ulcer between his shoulders was ill-conditioned.

"For the purpose of examining the condition of the aorta, where the arteria innominata is given off, as also the origin of the latter vessel, as well as the state of the pleura at the part about which the ligature had been applied around the artery, the chest was opened in the following manner: after removing the integuments and muscles from the fore part of the chest, the sternum was carefully sawed through about an inch from its upper extremity, and raised by sawing through the ribs below the junction of the cartilages; this removed

so much of the front part of the chest as to facilitate and expose fully to view the subsequent steps of the dissection; by thus leaving the clavicles attached, every part connected with the ulcer and great vessels could be seen and examined *in situ*.

"The arch of the aorta and origin of the innominata being fairly exposed, not a vestige of inflammation or its consequences could be discovered, either upon them, the lungs, or the pleura, at any part. An incision was next made, longitudinally into the aorta, opposite the origin of the innominata, and upon introducing a probe cautiously up the latter vessel, it was seen to pass into the cavity of the ulcer; the innominata was then laid open with a pair of scissors into the ulcer; the internal coat of this vessel was smooth and natural about its origin, but for half an inch below where the ligature had cut through the artery, it showed appearances of inflammation, and there was a coagulum adhering with considerable firmness to one of its sides; showing that nature had made an effort to plug up the extremity of so large a vessel, after the adhesion, which no doubt had been effected by the ligature, was swept away by the destructive process of ulceration. The upper extremity of this vessel was considerably diminished in its diameter by the thickened state of its coats, occasioned by the surrounding inflammation. The innominata about half an inch from the aorta, and a little to the left

side, gave off an anomalous artery large enough to admit a small size crow quill.

"The ulcer at the bottom was more than twice the size of the wound in the neck; it extended laterally towards the trachea; and under the clavicle, towards the tumour. The tripoid of great vessels, consisting of the innominata, subclavian, and carotid arteries, to the extent of nearly an inch, was dissolved and carried away by the ulceration. The extremities of the two latter vessels were found also to open into the cavity of the ulcer. The upper surface of the pleura was very much thickened by the deposit of newly organized matter, for the safety and protection of the cavity of the thorax. Indeed, instead of having increased the danger of penetrating this membrane, the adhesive inflammation which preceded the ulcerative, seemed, by the consolidation of cellular membrane, and the addition of new substance, to have more securely and effectually shielded it from danger.

"The internal surface of the carotid artery was lined with a coagulum of blood, more than twice the thickness of its coats, and extending above the division into internal and external, so as almost to give them a solid appearance, insomuch that a probe could barely be introduced. The subclavian artery, internally and externally to the disease, was pervious. The brachial and other arteries of the right arm were of their com-

mon diameter, and in every respect natural. The external thoracic or mammary arteries, as they went off from the subclavian, were larger than natural: the right internal mammary was pervious, and of the usual appearance. Upon opening into the tumour, which now gave (from its small size,) no deformity to the shoulder, the clavicle was involved in it, and found carious, and entirely disunited about the middle. A number of lymphatic glands under the clavicles, and particularly the left, were considerably enlarged, and when cut into, very soft, and evidently in a state of scrophulous suppuration. No other morbid appearances were observed."

Although this case terminated unfortunately, still its result, in so far as it concerns the operation of tying the arteria innominata, must be considered as conclusive evidence of its practicability. The operation was in fact so far as it was immediately concerned, successful; no alarming symptoms followed the tightening of the ligature, and the obstruction of the circulation through the channel of the vessel; the patient continued to improve in his health until the twenty-third day, when a hæmorrhage took place from an ulceration of the coats of the artery, an ulceration which frequently has occurred in instances where even the smaller arteries have been tied. If I might be permitted to offer a criticism on the performance of an operation, so novel in its character and so bold

in its design, I should feel disposed to object to the previous exposure of the subclavian artery. Indeed, I am inclined to think, that it was from the destruction of the vasa vasorum of so large a portion of the artery, that the fatal hæmorhage is to be attributed, and I can hardly doubt from the facts of the case that had the arteria innominata been at once exposed and tied, without any reference to the subclavian artery, that the event would have been different. This opinion I deliver, not with the view of detracting from the credit due to the intrepid operator, but, only from a desire to support and corroborate the sentiments of Mr. Burns.

I cannot dismiss this case without adverting to the very unfair and unhandsome criticisms which have been made on it, in some of the periodical journals of this country. It is, however, the fate of all who become the improvers of science, to be assailed by the malice and envy of their less distinguished contemporaries. Dr. Mott has the satisfaction of knowing that their attempts to injure his reputation have proved abortive, for the verdict of his merit is now attested by the most eminent and honorable members of his profession.

Note C.—p. 195.

Mr. Burns is not singular in giving an exaggerated account of the dangers and difficulties attendant on the operation of tying the carotid artery. His never having had an opportunity of passing a ligature around that vessel on the living subject, and his views in relation to it having been wholly derived from speculation, and the descriptions of the operations published by those who had performed them, offer for him a sufficient apology. As I am persuaded that nothing tends more to retard the advancement of surgery, than the exaggeration of difficulties, which, if they do exist, are easily surmounted, I consider it my duty, so far as my own experience will enable me, to assist in their removal.

One of the difficulties which has been particularly insisted upon, by most of those who have tied the carotid artery, is the alternate swell and collapse of the internal jugular vein. "*During inspiration it falls collapse, but during expiration it swells out full and tense, covering almost completely the artery. The transitions from emptiness to fullness are so rapid, that sufficient time is not allowed to detach it from the carotid.*" So powerful an impression did this and similar overcharged descriptions of the state of the vein, in relation to the artery,

make on my mind, that I confess, when I was first called on to tie the carotid, I proceeded to the performance of the operation with painful feelings of uncertainty and doubt, such as I had never experienced on any previous occasion. I was perfectly acquainted with the situation of the vessel; I had in hundreds of instances, with a single sweep of the scalpel, exposed it to view on the dead body, and its most minute connexions were familiar to my mind. Still this knowledge was not sufficient to inspire that confidence, which alone can give firmness and decision to the operator. The jugular vein swelling out so as to cover the artery, must be in an unnatural situation—a situation where it might be injured immediately after the division of the platysma myoides, and fascia. Operating, therefore, under the influence of this uncertainty as to the state of the vein, I proceeded with a caution, I may say a timidity, which prevented me from executing it with that rapidity and dexterity, for which my practical knowledge of anatomy, should have fitted me. Instead of dividing freely and with a large incision the skin, platysma myoides, and fascia, the wound of the skin was small, and that through the fascia still smaller, so that when the artery was exposed it lay deep-seated in a narrow pit-like wound, where it was impossible to detach it from its connexions. Indeed, finding it difficult to do this, and satisfied that

there was no swelling of the vein which could at all endanger its safety, I made a free dilation of the wound, and then with facility, secured the artery. This operation occupied nearly eight minutes in its performance. In the next case where I had occasion to perform the same operation, from erroneous impressions as to the state of the vein having been corrected, I accomplished it in less than three minutes.

I have been particular in this statement, and feeling persuaded that a confession of our difficulties and doubts will advance, more than a history of our successes, the science which we cultivate, I have not hesitated to speak openly of my own fears and misgivings.

Mr. Burns seems to consider, that the termination of the thoracic duct will be in danger, if "*the operation be performed low in the neck on the left side.*" This fear, I conceive, is altogether groundless. The duct, it is true, in its passage from the chest, does lie behind the left carotid; but, before that vessel has reached the lowest situation in the neck, where it would be possible to secure it with a ligature, the duct has separated from it, and passed outwards to reach the point of its termination. As to injury of the nervus superficialis cordis, this can only happen where the operator is so awkward as to destroy the posterior wall of the cervical sheath. Should it, however, happen, I confess I should not apprehend those alarming

consequences which some have anticipated. It will, by minute dissection, be discovered, that the nervus superficialis cordis is joined by numerous small nerves sent off from the lower cervical ganglion, so that even allowing that the nerve was destroyed above this point, there can be little doubt but that through the medium of these branches derived from the parent trunk, its functions would still continue to be performed.

Note D.—p. 286.

The method recommended by Mr. Cheselden, for removing enlarged tonsils by ligature, is one of great difficulty in its performance, and were there no other way in which it could be employed, I should, without hesitation, subscribe to the justness of Mr. Burns' observations, and give a preference to the knife in every instance. The application of a wire around the base of an enlarged tonsil, is, however, an operation which may be executed with the greatest facility, and should obtain, in my opinion, a decided preference over every other plan of operating. Dr. Physick, who is justly distinguished for his eminence in his profession, has published in the first number of the

Medical and Physical Journal of Philadelphia, an account of the method of using the wire and double canula in the removal of schirrous tonsils, which, as it explains the different steps of the operation, I shall take the liberty of transcribing.

" The double canula I employ is about four inches long, with short arms soldered on its sides, near one end of the instrument, at right angles to it. Through the canula I next pass a double iron wire, and fasten one of its extremities round one of the arms of the instrument, leaving the other free and projecting five or six inches. This enables me to increase or diminish the size of the noose, formed by the doubling of the wire, at pleasure. The selection of a proper piece of wire I consider of much importance. It should be tough and flexible, formed of soft pure iron, having firmness enough to allow of its being pushed backwards and forwards in the canula, without bending too easily, so that the noose may be enlarged or diminished. It should also have sufficient firmness to allow of a little lateral pressure, otherwise the noose cannot be pressed down so certainly on the base of the tumour. The wire I use is about one twenty-fourth of an inch in diameter, or perhaps rather less.

" It is moreover necessary to be provided with a flat pair of pliers, to take hold of and move the wire conveniently. These instruments being prepared, the noose formed by the doubling of the

wire projecting beyond the end of the instrument, is to be made large enough to pass easily over the enlarged tonsil, and should be bent a little to one side, in order that it may more easily be pushed down upon the base of the tumour.

"The patient is to be seated opposite a window, and his tongue must be held down by an assistant, with the handle of a large spoon, or with a spatula. The surgeon is then to slip the noose over the tonsil, and down to its base, taking care not to include the uvula, which, when the swelling is large, is apt to be in the way. The wire is then to be drawn sufficiently to fix it loosely on the part, and the surgeon is to satisfy himself, by an attentive inspection, that it is properly applied. This being accomplished, the wire is to be taken hold of with the pliers, and drawn through one side of the canula, so as to secure it at once on the base of the tonsil as firmly as possible, and then to fasten it on the arm of the instrument, and thereby prevent all entrance of fresh blood into the tumour. This method of stopping the circulation of blood in the swelling, necessarily occasions severe pain at the moment; but the severity of it soon ceases.

"On examining the tonsil after a few minutes, its colour will be observed to be changed to a deep purple, or almost black, and its surface smooth and polished, owing to the exterior membrane being stretched.

"It has hitherto been my custom to allow the instrument to remain thus applied for twenty-four hours, with the view of destroying completely the life of the enlarged gland. I am, however, of opinion, that a much shorter time would be sufficient, as eight or twelve hours, which I propose soon to ascertain. After having destroyed the life of the swelling by the above means, the next step of the operation is the removal of the instrument, which is very easily accomplished, in the following manner. Take a firm hold of the end of the canula projecting from the mouth, then disengage the wire on one side from the arm of the instrument; straighten it, and with the pliers push a small portion of it back through the canula, and repeat this until the noose is so much enlarged as to slip off the tonsil.

"The operation is now completed; the tumour appears shrivelled and of a dull white colour; the patient suffers no pain; the inflammation is moderate, and, after a few days, the dead parts are separated and thrown off, either entire or in fragments, which are sometimes spit out, sometimes swallowed. Until the separation is completed the breath is somewhat offensive. I have never had any trouble with the small ulcer remaining after the separation of the tumour. It has healed so rapidly as generally to escape notice." *

* Philadelphia Medical and Physical Journal, p. 18, et seq.

Another plan for applying the ligature has been recommended lately by Mr. Chevalier;* but the one just described, whether viewed in relation to its simplicity or certainty, is decidedly superior to it.

Note E.—p. 352.

Mr. Burns observes, in speaking of the cure of aneurism by anastomosis, that "any attempt to cure this disease by *ligature of the arteries which support it*, is entirely out of the question. Mr. John Bell strenuously argues the necessity of cutting out *all* the diseased parts, and in equally decided terms reprobates any interference when we judge this to be impracticable." From these observations it would appear, that at the time when Mr. Burns' work was published, anastomosing aneurisms were considered as incurable, unless when placed in situations where they could be completely extirpated, or if this was impossible, where we had the "*power to use very firm pressure*" on all the morbid parts which remained. As there are many cases of this disease in which it is neither practicable to extirpate the whole of the morbid parts, nor to apply "*firm pressure*" to those which remain; if the doctrine delivered by Mr. Burns and Mr. Bell, was cor-

* Medico Chirurgical Transactions, vol. iii. p. 80.

rect, patients, so situated, must be left to their fate. Fortunately, however, the progress of science has shown the fallacy of those opinions, and has demonstrated, that by tying the great artery passing to the morbid parts, we can cure an anastomosing aneurism nearly with the same certainty as a common aneurism. To Mr. Travers, a gentleman whose name is familiar to every member of the profession, we are indebted for this improvement in the treating of aneurism by anastomosis. In a case where a tumour of this kind was situated in the orbit, he tied, with complete success, the common carotid artery of the same side.* The same operation has since been performed by Mr. Dalrymple,† for the cure of an anastomosing aneurism, which in its situation and character exactly resembled the one described by Mr. Travers, and the ligature of the carotid was attended with the same success.

In a case of the same disease, situated in the branches of the internal maxillary artery, which came under my own observation, I had an opportunity of testing and proving the justness of the views taught by Mr. Travers. As this case is one of great interest I shall transcribe it.

"Mr. C. C. aged eighteen years, consulted me the sixth of April, 1821, on account of a great

* See Medico Chirurgical Transactions, vol. ii. † Ibid. vol. vi.

tumefaction of the left side of the face. As the history of the origin and progress of the disease is very ably detailed in two letters, which I have received from my patient after his return home, I shall introduce them, as containing a more distinct account of the complaint than any I could furnish.

"*George Town, May* 30, 1821.

"DEAR SIR,

"Agreeably to my promise, I now send you a detailed account of the disease in my face, from its commencement down to the period of the late operation. My own recollections have been assisted by my nurse, who has been in the family during the whole course of the disease, and whose situation, whilst I remained at home, afforded her a better opportunity than others of observing the circumstances attending it.

"To the best of my recollection, the disease first appeared in the cheek early in the summer of 1813, I being then ten years of age; about the end of the season, it began to make its appearance about the temple, when it first excited the alarm of my friends. After this time, I paid several visits to Philadelphia, for the purpose of consulting the professional gentlemen of that city, and I recollect these were for some time in doubt before they determined the disease to be a polypus. At one time they decided that it was not,

and perhaps their final determination was influenced by this circumstance, I told them, and with much confidence too, that I believed the disease to have originated in the nostril. As the disease at first gave me no uneasiness, and occupied little of my thoughts, I might readily have been mistaken in this circumstance, and my own subsequent reflection, as well as the opinion of my nurse, induces me to believe that I did err.

"The period of the first operation I do not remember, but its duration was about three-fourths of an hour; and, though I was able to walk about the same evening, I considered it more disagreeable than the second. The next operation was in the spring of 1815, and was much more extensive; but as I believe you are acquainted with its nature, I will not enter into a detail of it.* I would, however, mention, that after a considerable time, I fainted from loss of blood, which forced them to stop the operation. The doctors hoped that they had rid me of the disease, and for some time there

* Both of the operations to which Mr. C. refers, were performed under the erroneous impression that the disease was a polypus. The first was executed with a ligature, and forceps introduced through the nostril. The surgeon at this time entertaining the belief that the disease was confined to the nostril. The cheek, however, beginning to swell shortly afterwards, it was supposed that the polypus had originated from the antrum, and an operation was performed with a view of extirpating it. The operation consisted in removing with the trephine, the anterior wall of the antrum, and thus having exposed the tumour, an attempt was made to cut it out. The bleeding was, however, such as soon to put a stop to the operation. The quantity of blood lost during it was very great, and the patient was so enfeebled as to be obliged to remain in bed for some weeks afterwards.

was a diminution of the cheek and an absence of the disease in the nose. These favourable appearances were of short duration; the disease re-appeared, and gradually increased, without the application of any remedy, until the commencement of the last fall. I was induced a short time previously, to consult a person who had the reputation of being successful, in treating several novel cases; and as his remedies appeared simple, and he appeared confident, I determined to follow his advice. Having been foolish enough to submit to his directions, the hope of relief induced me to continue that submission when his treatment became more severe; and thus I subjected myself to much trouble, pain, and expense, without reaping any good fruits.

"I do not remember any violent bleedings previously to the first operation; and though I recollect having experienced them between this and the second, yet, from the lapse of time, I have a very indistinct idea of the circumstances attending. It was after the second operation that they were most frequent and most violent. In the summer of 1817, they became so frequent as to alarm my friends. If I overheated myself, or suffered a slight blow on the nose, or was jarred, my nose would bleed violently; sometimes it would bleed spontaneously. In two days (in three bleedings) it bled so very copiously, from my having blown my nose, that I was confined, from its

effects, for some days after. The blood I would lose at each of these bleedings, would frequently measure a pint, and sometimes would exceed this quantity: it would stream out most violently, and all exertions to stop it appeared to have no good effect. In the summer of 1818, I was at college, and the bleedings were then more violent than ever. Having no person with whom I could consult, I felt much alarm at my situation, and it must have been very dangerous. Very frequently, whilst I would be sitting quietly in my room, (I was careful to use as little motion as possible,) the blood would gush forth in torrents, I having no previous notice that it was coming. Especially during the warmest part of the season, I was obliged to restrict myself very much in exercise; a slight exertion, a very short walk in the heat of the day, was generally followed by a violent bleeding. At one time, I was obliged to debar myself entirely of exercise; a walk of twenty yards in the sun has produced a violent bleeding. Sometimes I had warning of a violent bleeding by a slight spontaneous one, and in this case, I generally took a dose of salts, which had the effect of retarding it. Sometimes, though not so violently, the blood would descend through the orifice to the mouth, as if unable to obtain a vent in the usual way. I have remarked this circumstance in the bleedings, that they were most violent and frequent in the warmest weather; in the winter, I

seldom bled beyond what many persons in health are subject to. Since 1818, I do not remember any violent bleedings until the last winter. If there have been any, they were very rare. During the last winter I had two or three that were pretty copious, but they were all caused by following the prescriptions of the German doctor.

"Having delayed writing for some time, I now address you in such haste as, perhaps, to omit some points on which you wish information. Should this be the case, I will gladly give you any further information in my power.

With much respect,

I remain, dear sir,

Your most obedient servant,

C. C.

"*George Town, June* 4, 1821.

"DEAR SIR,

"IN the haste of my former communication, I omitted some particulars which it may be agreeable to you to hear.

The left cheek, at its usual temperature, was always warmer than the other, and was much more easily affected by exposure. So delicate was it, that when obliged to expose myself to the summer's sun, if the rays fell in that direction, I was obliged to cover the affected cheek; and I have frequently suffered inconvenience from lying on it.

"There was also in this cheek a very peculiar feeling, which extended itself over the left half of the upper jaw. I am at a loss to describe this peculiarity; but it has now entirely disappeared, and, to the feeling, the parts are as well as those corresponding on the opposite side of the face.

"The fine air of our town has worked a miracle in my favour; my strength is returning very fast, and both neck and cheek are doing very well.

With the highest respect,

I am, your obedient servant,

C. C.

"The tumour of the cheek was at the time I saw Mr. C. very large, its central point occupied the situation of the antrum higmorianum; but the walls of this cavity having been destroyed, it passed from thence in every direction upwards, into the orbit, protruding the eye, nasally it passed into the nostril of the left side, which it completely filled, and pressing on the septum-narium, it gave a general character of distortion to the nose. This tumour was, however, most prominent in a direction outwards. The second operation having removed the anterior wall of the antrum in this direction, there was nothing opposed to its passage, except the small facial muscles; and their forces, although they might have a tendency to prevent its direct growth outwards, could have little effect in restraining it from growing in

a direction outwards and backwards. The symmetry of the left side of the countenance was completely destroyed. The tumour, which in size was nearly equal to the head of a new born child, extended from the left margin of the nose, to the line which is marked on the neck by the tracheal margin of the sterno-cleido-mastoideus muscle. When the disease was examined as it appeared in the nostril, the first impression produced, was that it was a polypus of the antrum. This impression could not, however, after an attentive examination be entertained; there is in all polypi, an expression, if I may use the term, altogether peculiar; their vitality is of a low grade, and their imperfect organization is so marked as to enable us to distinguish them from all other affections. Had it, however been otherwise, and had we, from the examination of the tumour as it appeared in the nostril, been led to adopt an erroneous opinion as to its true nature, this must have been corrected by pressing the tumour betwixt the fingers, one having been introduced into the mouth, and another placed on its external surface; as thus examined, the distinguishing character of anastomosing aneurism was at once detected, that peculiar pulsatory throbbing which characterizes them from all other affections, being distinctly felt. The opinion I delivered to my very intelligent friend, Mr. Hayden, was, that the disease was an anastomosing aneurism, situated in

the terminating branches of the internal maxillary artery; that the disease having begun behind the *tuber maxillare* had first entered the nostril, inducing the belief that polypus had formed there; that from thence it had, by destroying the posterior wall of the antrum higmorianum passed into and occupied that cavity; that enlarging, it had protruded and rendered prominent the external wall of the antrum, which was by the surgeon removed, with the view of extirpating it, under the impression that the polypus had entered the cave of the cheek.

"Mr. Hayden, on receiving this statement, assured me that from the examination which he had made when consulted by Mr. C. at Washington City, he had believed that the disease was a common aneurism; but as this opinion was opposed to the one given by the eminent surgeons who had performed the two operations upon it, he had begged Mr. C. to visit Baltimore and consult me; and anxious that his patient might hear my opinion unbiassed by any observations of his, he had determined not to state his suspicions until I had delivered to Mr. C. my opinion.

"Had I from an examination found any difficulty in deciding on the nature of the disease, recalling to recollection the facts of its history, I could not have hesitated. Its progress, the suspicious temperature of the tumour, but above all, its frequent

and tremendous hæmorrhage, were symptoms which could not have been found attendant on any other affection. As to the proper plan of treatment, there could be with bold and intelligent surgeons but one opinion. Mr. C. held his life on a most uncertain tenure, every hour he was in eminent jeopardy of losing it, and every evening, as he closed his eyes in sleep, a bleeding occurring during his slumbers might have placed the cold seal of death upon his eyes, and prevented them from ever again beholding the light of the morning.

"To prove that his state was as dangerous a one as we have represented, it is only necessary to state, that, about two months before Mr. C. came to Baltimore, the blood gushed in such a torrent from his nostril, as to render him insensible before he could reach the bell, and he was only accidentally discovered some time afterwards, in a state of syncope, by a member of his family who happened to enter his chamber. The operation of extirpating the tumour of vessels was out of the question. Could we even have flattered ourselves that our patient could have survived the great effusion of blood which must have followed cutting into it; it was impossible to expect that a substance so soft and pliable, would not have passed into some of the small osseous recesses situated in the facial bones, and would there have eluded our search, and formed a root from which the disease would

speedily have been reproduced. The only operation by which we could hope to benefit Mr. C. was that of tying the great carotid artery, and thus throwing the circulation of the facial arteries of that side into new channels, and by this means taking off its pressure from those branches which were diseased. Reasoning upon general principles, we were entitled to hope this result. And bringing to mind the success which had followed the ligature of the carotid, in the cases of anastomosing aneurism recorded by Messrs. Travers and Dalrymple, the justness of our hopes was confirmed. There was, however, more to be apprehended in the case of Mr. C. than in the ones alluded to. From its situation, and from its long continuation and great size, very considerable disease in the parts surrounding it was to be apprehended. The ligature of the artery would destroy the aneurismal character of the tumour; but its irritation had produced so much thickening and disease in the surrounding parts, that it was not improbable that they, receiving a sufficiency of blood for their support, might continue to increase, and finally, by ulceration and the assumption of a specific morbid action, terminate in the death of our patient. As Mr. C. possessed a mind of a very superior order, I did not hesitate to make him fully acquainted with every particular of his case. I informed him, that in my opinion, an operation ought to be performed, but, at the same time

requested him, on account of the very different view which had been taken of his case by the professional gentlemen of Philadelphia, to consult, before submitting to it, my distinguished friend and colleague Dr. Davidge. Having seen that gentleman and obtained from him an opinion which coincided in every particular with the one which I had before delivered; Mr. C. with the most manly fortitude, at once consented to the performance of an operation.

"The operation was performed in the way it is usually executed. Immediately after its performance, the appearance of the tumour, as it presented itself in the nostril, became remarkably changed; just before it seemed distended, even to bursting; but so soon as the direct circulation was removed, its distension was destroyed, and it became shrivelled on its surface. The pulsatory movement, which could, previous to the operation, be easily discovered in the body of the tumour, could not, after it was executed, be detected. As nothing remarkable occurred during the progress of the cure, it is quite unnecessary to give a detailed account of it. It is sufficient, in regard to the treatment, to observe, that with the view of taking from the force of the circulation, and of preventing the spreading of the inflammation from the wound to the neighbouring parts, free depletion by means of the lancet and purgatives was adopted. And in respect to the appearance of

the tumour, it is only necessary to state, that there was a daily improvement in the expression of the countenance. The absorbents fulfilled their duties with much more energy than could have been expected; the tumefaction entirely disappeared; the malar bone, and zygoma which were completely buried in the tumour, as it was absorbed became evident, and the whole character of the countenance became altered.

"The deformity, in so far as it was produced by the aneurismal tumour, was completely removed before Mr. C.'s return home; but, as the tumour had produced an enlargement and forcing of the bones of the side of the face outwards, and as their absorption is a slow process, the side of the face where the disease had been seated continued somewhat more enlarged than the opposite side. The absorption is however going on steadily, and there is every reason to hope, that by the employment of pressure, the natural symmetry of the countenance will be speedily restored."*

* It is now two years and a half since the operation was performed on Mr. C. and during the whole of this period, no symptom has manifested itself which could lead to the suspicion that the disease was about to return. On the contrary, the improvement in his appearance has been regularly progressive, and he has enjoyed the most perfect and uninterrupted good health. At present the deformity is so trifling as to be hardly perceptible.

Note F.—p. 385.

There have been, perhaps, no operations performed, which have been so unfortunate in their results, as those executed for the removal of tumours from the antrum maxillare. Buried amongst the bones of the face, before they have increased to such a size as to attract either the attention of the patient or his surgeon, they have, in most cases, passed into numerous recesses, from which it was impossible to remove every diseased part. As these affections are far from being uncommon, I had devoted considerable attention to their study, and had, from reasoning on general principles, formed certain conclusions as to the best method of proceeding to their removal, the correctness of which I think has been confirmed, by the result of some cases where these principles have been adopted.

We are well aware, that the vitality, or capacity for action of a part, is proportioned to its vascularity. We know also, that if we excite a part to the performance of an action beyond its power, that as a necessary consequence, its vitality is destroyed, it sloughs, and is thrown off. These principles, which are universally admitted, constitute the basis of a theory which has dictated the plan of treatment I have considered

the most advisable to be pursued in cases of tumours in the antrum, and which has, where executed in the only cases I have known, proved successful.

When in Baltimore on a visit, in the month of July, 1820, before my election to the Chair of Surgery in the University of Maryland, I was requested by Dr. Baker, to visit a James Underwood, who was affected with a tumour of the antrum. The disease had proceeded to a very great extent. The walls of the cavity, from which it had originated, were burst asunder. It passed down through the osseous palate, so as to fill the mouth and to push backwards the velum pendulum palati, and outwards so as completely to disfigure the cheek of that side, forming there a large and unseemly fungus. I particularly stated at this time, to Drs. M'Dowell, Revere, and Hall, that, as the disease manifested so many characters of its being of a specific nature, I did not feel myself warranted to press the patient to submit to an operation, as no man, I conceived, could ensure its being successful; at the same time, I explicitly declared, that if he would be willing to submit to one without an assurance of certain success, I was perfectly ready to operate.

I heard nothing more of the case until the following October, when I was politely invited by Dr. Gillingham to be present at the operation which he proposed to perform on the same patient.

There were in the chamber, where the operation was to be performed, a great number of professional gentlemen, and I there openly and freely expressed my views as to the operation which I thought ought to be performed. To my friend Dr. Davidge, who was standing with Dr. Jameson, in one part of the room, I explained particularly my sentiments, and insisted on the propriety of tying the common carotid artery of the side on which the tumour was situated, before any attempt was made to extirpate it. I did not apprehend that during the operation of its removal, the patient would be subjected to a dangerous hæmorrhage, and that this was to be guarded against, by the ligature of the artery. Another and in my opinion, a much more important object, was to be gained by it. The vascularity and consequent vitality of the tumour was much inferior to that of the parts with which it was connected; and as they, and likewise any portions of the diseased mass, which it might be impossible to remove with the knife, would by the operation be brought into a state of inflammation, and increased action,—I hoped, by diminishing the circulation of blood through them, that the morbid parts, whose power of action was previously weak, would in the enfeebled state in which they would be placed by the ligature of the artery, be incapable of supporting the increased action which would be demanded of them, and that

they would mortify and fall off. These sentiments I had stated fully to Drs. M'Dowell, Revere, and Hall, when I was first consulted on the case, and repeated them at this time to Dr. Davidge in the presence of Dr. Jameson.

The operation for which the company had assembled having been postponed, I heard nothing more of the case for some days, when, having learned that Dr. Gillingham declined interfering in it, I made inquiries for the purpose of getting the patient to submit to the operation I had suggested. Having been informed that Dr. Jameson had taken charge of the case, I, of course, gave up all thoughts of interfering with it.

Dr. Jameson operated sometime afterwards, tying the carotid artery and then removing *a part of the tumour*. Believing it "to be a case of tumour of the gums" he did not enter the antrum. This fact I consider important, as it tends to corroborate and support the principles I have already stated. That it did originate from the cave of the cheek, my learned colleague Dr. Davidge had demonstrated in the presence of several medical gentlemen, some months before, by cutting through the palate and showing the whole of that cavity impacted and filled with the morbid substance. The operation, therefore, only removed a very small part of the tumour, and the removal of the rest must be attributed to its not possessing power after the artery was tied for the ful-

filment of that action which it was called on to perform.

The justness of the principle which I have brought before the observation of the profession, does not, however, rest on the success of this single case. My friend, Dr. Davidge, has carried it farther than I had contemplated, and, as it will appear from the following letter, in so far as the tumour was concerned, with the happiest result.

"*Professor Pattison,*

"Dear Sir,

"In pursuance of my promise, I transmit to you the subjoined account of the operation, performed by me, for the fungus of the antrum of the face.

"On the third of April, 1823, a negro man, at the house of Mr. Floyd, was put under my professional charge; he laboured under a fungus of the antrum of the left side of the face; the condition of the body was hectic, and very much emaciated; the upper part of the cheek protruded, and was much distorted; the tumour had destroyed a considerable portion of the lower and external region of the superior maxillary bone, and descended into the mouth. The finger, by pressing the fungus a little to one side, could be passed up into the antrum.

"The day precedent to the operation, a cathartic was administered.

"After having placed the patient in a proper

sitting position, and opposite a good light, attended by several young professional gentlemen, I made an incision of about three inches in length, down to the delicate fascia, along the track of the carotid artery, inclining my knife a little to the trachea, to avoid exposing the internal jugular vein. I then, by a second cut, exposed the sterno-cleido-mastoideus just where it is somewhat obliquely traversed by the omo-hyoideus, in its course from the upper costa of the scapula, to the os-hyoides, and by a careful dissection in the angle formed by these two muscles, discovered the sheath of the artery, which was immediately laid open directly in front, and the artery made bare. I passed under it, by means of the eye-handled probe, an animal ligature; this upon tightening gave way, and its place was supplied by one of silk, which was prepared. The artery being secured by *single* ligature, I dressed the wound after my common method of securing incised wounds. During the operation, which occupied altogether three or four minutes, there were no difficulties encountered, either from the jugular vein or nervus vagus.

" Subsequent to the operation, the patient was free of complaint, except the unimportant sensation resulting from incision, until the fifth or sixth day, when he complained of pain and soreness about the parotid. To this pain and soreness succeeded inflammation, swelling, and finally, co-

pious suppuration. This was at a considerable distance, even at its most inferior point from the wound, which continued to go on well; he swallowed with facility, and breathed throughout the whole time with the utmost ease and freedom. His appetite became good, and he improved very much in flesh and strength; about the fifth week he went home in a vessel, which was at the wharf from the county in which he lived.

A day or two previous to his leaving the city, a very considerable hæmorrhage took place from the nose; which, however, soon ceased. The ligature was not away, when he left the city; it was cut close. But about five days after his arrival at home, that is, about six weeks subsequent to the operation, he was attacked by lock-jaw (trismus) of which he died.

"Mr. Fitzhugh, a young gentleman of my office, who was present at the operation and continued to visit the patient, has been so polite as to inquire into the circumstances of his death. He also reports that the physician of the family, examined after death the parts concerned in the operation, and found every thing in the best possible condition.

"Had I been apprised of your wish sooner, I would have written to the family physician, and obtained a detailed account of what occurred.

Very respectfully, yours,

JOHN B. DAVIDGE."

October 15, 1823.

"P. S. Perhaps it may be of moment, that I mention to you what attentions were directed to the tumour itself, subsequently to the tying the artery. The tumour was left to itself, protruded down through the opening in the bone. It gradually fell into mortification, and sloughed away so completely, that no vestige could be discovered by the most careful examination, by the finger introduced into the antrum; no part was removed, either by knife, scissors, or caustic. I was solicitous to ascertain the effect of tying the artery on the tumour, and perceiving it to fall away so rapidly, I merely desired the patient to pay regard to the state of the mouth, and frequently cleanse it."

Since I have received the proof of this sheet, I have been informed by my friend Dr. Hall, that he has lately tied the carotid artery, in a case of fungus of the antrum, and that although no operation was performed on the tumour itself, the disease was removed.

Believing the application of this principle to the treatment of tumours of the antrum original and important, I have considered it my duty to take some pains in placing a correct statement of the subject before the profession.

Mr. Burns, says nothing in his work on the subject of operations for the removal of portions of

the lower jaw, in cases where it is affected with medulary sarcoma. Indeed, this operation is one of very late date. Dr. Mott, whose name I have already had occasion to mention, as one to whom surgery is much indebted; was the first, who suggested the bold operation of removing nearly the whole of the lower jaw in a case of this disease, and has now operated successfully in four cases. It is true, that we have lately been informed that Graffe, had done something of the same kind, but the particulars are not stated. Dupuytren, when I was in Paris, removed a considerable portion of the angle of the jaw, in a case where a cancerous sore was situated over it; the extent of this operation was, however, trifling when compared with those executed by Dr. Mott. My friend Dr. M'Clellan, whose talents have already procured for him a distinguished rank in his profession, a few months ago, removed nearly the whole jaw bone from a child.

I transcribe two cases where this operation has been performed. No. I, is the first case on which Dr. Mott operated, and No. II, is a notice of Dr. M'Clellan's case, published by some person who had witnessed the operation, in the Boston Medical Intelligencer.

No. I.

"Catharine Bucklew, the subject of the following operation, was an interesting young woman,

aged about seventeen years, of a healthy appearance and good constitution.

"She says that about two years since, a swelling commenced behind the last molar tooth of the lower jaw, attended with acute pain about the angle of the jaw, that continued about three weeks; at which time it left her without any evident resolution of the inflammation. At this period there was no inflammation of the integuments, nor could any pus be discovered either on the cheek or about the bone within the mouth. Some domestic applications were made to the cheek, but the tumefaction continued to increase, and assumed a smooth, hard, and bony character.

"About twelve months after its commencement she applied to a physician in New-Jersey, who advised her to apply blisters to the cheek, and the use of topical applications of caustic to the tumour, together with a general antiphlogistic constitutional treatment. After having submitted to this course for two months without experiencing any benefit, she came to this city, and became my patient.

"The first molar tooth came away early in the disease, and the second soon followed; then, three or four of the other teeth of that side of the lower jaw. She states, that previously to this disease she never had a decayed tooth.

"No fluctuation was to be felt at any time in the tumour. She had no constitutional symptoms

as the effect of this disease, nor any inordinate headache on that side. The lymphatic glands of the neck were however swollen, during the continuance of the inflammation in the early part of the disease; but they disappeared as soon as the pain subsided.

"When she came under my care, the tumour extended from the root of the coronoid process to the second bicuspid tooth, elevated nearly an inch above the level of the teeth, and spreading considerably wider than the alveolar process. Its appearance was smooth, and to the touch somewhat elastic, though firm. An incision on each side of the alveolar margin, with a scalpel, enabled me pretty readily to remove the tumour with a gum-lancet to the level of the jaw-bone. The tumour, on examination, contained many cartilaginous and osseous spiculæ, and in the substance of it was imbedded one of the molar teeth in a perfectly sound state.

"About three weeks after this operation a small portion of the size of a nutmeg, which had granulated and grown rapidly, was taken off, and soon after she retired to the country, and remained in a very comfortable state for several months. The tumour began now to re-appear, and continued to increase gradually in every direction.

"The tumour at present (Nov. 10th, 1821,) has the same firm and slightly elastic feel which characterized it in the early stage, involving all the

right side of the inferior maxillary bone. Projecting outwards, it produces great convexity of the cheek: upwards it divides into two portions, the outer and longest reaches up to the os malæ, and between the two is a considerable furrow, formed by the teeth of the upper jaw, which occasions an abrasion and constant discharge; the latter, though offensive, does not appear to be acrid or irritating; downwards it comes nearly in contact with the thyroid cartilage; inwards it extends beyond the middle line of the mouth, pushing the tongue and uvula very much to the left side, having the velum pendulum palati of the right side attached to it in its whole course. The inward portion is considerably raised above the level of the tongue when the mouth is opened.

"The posterior extremity of the tumour has encroached so much upon the passage leading into the posterior fauces, and the pressure of the lower parts upon the larynx is so considerable, as to render deglutition very difficult; and from the great difficulty of mastication, she has been compelled for some time to subsist upon liquid aliment. Her speech is considerably interfered with in consequence of the displacement of the tongue. She experiences no pain in any part of the tumour.

"The gradual increase of the disease rendering mastication and deglutition more difficult and distressing, she is very desirous of knowing if an

operation could not be performed which might extend to her some chance of life; observing, that with the constant growth of the tumour, such as has taken place for a few weeks past, she should not be able to swallow any thing in a short time. Fully aware of the dangerous nature of the novel operation her case requires, she is determined to submit to it, and hazard the consequences; the uncertain result of which I carefully explained to her, and informed her, that she might die during the performance of the operation; but that I believed it to be both practicable and proper.

"After preparing the system for about a week with light diet, and the exhibition of several dozes of neutral salts, to obviate any great degree of inflammation, the operation was commenced about eleven o'clock on the morning of the 17th.

"As most of the important branches of the external carotid artery would be interfered with in the course of this operation, I believed it most prudent to pass a ligature around the trunk of the carotids as a first and preparatory step. This would not only enable me to go through it with more safety to the patient, but appeared the most important of all means to avoid inflammation. Indeed inflammation was much to be dreaded, from the immense extent of the external incision, and the violence which would necessarily be done to the tongue, palate, and pharynx.

"From these considerations, I felt it doubly important to intercept the current of blood through the common carotid, and from what I had observed to attend the application of ligatures to the large arteries of the extremities, in cases of severe injuries, by preventing inflammation, I thought great advantage would attend it in this case, as I am satisfied will be fully shown.

"An incision about two inches and a-half long, was made a little below the thyroid cartilage on the inner edge of the sterno-cleido-mastoideus muscle, and after exposing the carotid, a single ligature was passed under it and tied. In this situation it was deemed most proper to tie the carotid, in order to prevent the second part of the operation from interfering with the first incision. Very little blood was lost, only one small cutaneous branch at the lower angle of the wound required a ligature; yet she became pale and almost pulseless during, and immediately after the operation, notwithstanding her position was recumbent. She submitted to the operation with great firmness and resolution, but her mind soon became agitated and perturbed to a great degree, and it seemed altogether impossible for her to regain her former fortitude. The operation was suspended, and some cordial was administered, but it failed to remove from her mind the presentiment that any further proceeding at present would be fatal. In this state of remarkable agi-

tation I resolved not to proceed, and informed her that with such fears as she then entertained, the result was to be dreaded. The wound was then dressed, and she was put in bed, faint and exhausted.

"After recovering a little, I apprised her that this was only preparatory to the most important part of the operation, and that what had been done would prove of little or no benefit to the disease, and urged her seriously to consider of it, and if possible make up her mind to submit to the performance of the remaining part, which should by no means be deferred longer than the following day.

"One o'clock, p. m.—She is still pale, and in a cold sweat; pulse has not recovered itself and when asked, nodded that she felt some uneasiness.

"Seven o'clock, p. m.—Much more collected; pulse natural; no uneasiness whatever, except some obtuse pain about the wound in breathing, and in swallowing saliva; no increase of heat; left a student to watch with her through the night, and again took leave, earnestly recommending to her private consideration the expediency of submitting to the remainder of the operation.

"18th.—Seven o'clock, a. m.—Found her this morning in a very composd state of mind; having slept well, and free from fever. Upon putting the question, would she submit to the remainder of the operation? she nodded assent with much

apparent decision, and said she was determined to undergo it.

"At ten o'clock, finding my patient cheerful and resolute, she was again placed upon the table, and, in the presence of William Anderson, surgeon, Dr. Hosack, and a number of other gentlemen, the operation was continued. Feeling for the condyloid process, an incision was commenced upon it, opposite the lobe of the ear, carried downwards over the angle of the jaw in a semicircular direction along the lower part of the tumour, as it rested upon the thyroid cartilage, and terminated it about half an inch beyond the angle of the mouth, on the chin. The termination of this incision upon the chin, was just above the attachment of the under lip to the bone, and the mouth was thereby laid open. I now extracted the second incisor tooth of that side, as it was in a sound part of the bone, and after separating the soft parts from the side of the chin, and laying bare the bone, I introduced a narrow saw, about three inches long, similar to a key-hole saw, from within the mouth, through the wound, and sawed through the jaw bone from above downwards. The lower part of the tumour was then laid bare, by cutting through the mylo-hyoid muscle, and the flap of the cheek carefully separated and turned up over the eye. This exposed fully to view the whole extent of the tumour as it rose upwards to the os malæ. After the integuments were carefully dis-

sected from the parotid gland, the masseter muscle was detached from its insertion, until it came to the edge of this gland, then separating a thin plane of the fibres of this muscle, I now readily raised the parotid, without wounding it at this part. The maxilla inferior was now laid bare just below its division into two processes, and it appeared sound. To facilitate the sawing of the bones, it was necessary to make a second incision, about an inch long, close to the lobe of the ear, and terminating at the edge of the mastoid muscle; then, with a fine saw, made for the purpose, smaller and more convex than Hey's, I began to saw through the bone, obliquely downwards and backwards, and finished with one less convex. The latter part of the sawing was done with great caution, to avoid excruciating pain from the laceration of the inferior maxiliary nerve. When the bone was sawed through, the two processes were observed to be split asunder, and the coronoid to be drawn up by the action of the temporal muscle.

"An elevator was now introduced where the bone was divided at the chin, by which the diseased portion was raised, when, with a scalpel passed into the mouth, the tumour was separated from the side of the tongue, as far back as the posterior fauces, from the velum pendulum palati and pterygoid processes. This loosened it very much, so that it could be turned upon the side of

the neck. It was then separated from the parts below the base of the jaw, and also from the pharynx, and detached at the posterior angle, carefully avoiding the trunk of the internal carotid and deep-seated jugular vein, both of which were exposed.

"The diseased mass, being now separated above and below, was turned up, the pterygoid muscles detached, and the third branch of the fifth pair of nerves divided from below, a little above the foramen at which it enters the bone. By this manner of proceeding, with a constant reference to this nerve, I apprehend my patient was saved from much acute pain, and the nerve more safely divided, than at an earlier stage of the operation.

"At several periods of this operation, the curved spatulas, used in my operation, upon the *arteria inominata*, were found very useful, particularly in elevating the parotid gland, and keeping the tongue steady, whilst the tumour was separated from it.

"Very little blood was lost during this operation. Two arteries only of any size were divided, the facial and lingual; and these only required the ligatures at the branch extremities; but each end was tied for safety. Another small artery behind, and a little underneath the posterior angle of the jaw, yielded some blood and was tied.

"The flap of the cheek was now brought down, after waiting a few minutes to observe if any hæ-

morrhage should come on, and secured in close apposition by three sutures, and adhesive straps. Lint, a compress, and the double-headed roller, completed the dressing. She was made as comfortable as possible upon the table, and directed to remain a few hours to recruit, and to be more convenient in case any hæmorrhage should make it necessary to remove the dressings.

"At eight o'clock in the evening, I found her removed to a bed, and in a comfortable situation. Some re-action of the circulation had taken place, but there had been no hæmorrhage. The pain from the operation, she said, was less than she expected. For the first time, since the operation, she sipped three tea-spoonfuls of cold water, and gave evidence, by a nod, that she could swallow. Directed one hundred drops of tinct. opii to be given, if any twitching, more pain, or restlessness should supervene.

"19th.—Seven o'clock, a. m.—Found her quite free from fever and irritation, and, in every respect comfortable. Swallows cold water by the tea-spoonful with but little inconvenience. Did not take the tinct. opii last night. Slept several hours during the night.

"Twelve o'clock, at noon.—Is comfortable; skin moist; pulse less frequent and soft; directed an enema to be administered of soft-soap and water; has a little more difficulty in swallowing, but none in breathing.

"Nine o'clock, p. m.—As well as in the morning. Enema operated three times, and relieved her. Pulse frequent, but not tense. She has taken about two ounces of cold water by the tea-spoonful since day light.

"20th.—Seven o'clock, a. m.—Had a very comfortable night. This morning, instead of nodding, she answers 'yes' and 'no' to the several questions, in an audible whisper.

"Nine o'clock, p. m.—Much as in the morning.

"21st.—Nine o'clock, a. m.—As comfortable as yesterday morning.

"Nine o'clock, p. m.—No material alteration.

"22d.—Nine o'clock, a. m.—Directed an enema to be administered as before. Allowed her to take, in addition to her cold water and teas, some thin chicken soup; is in every respect doing well.

"Nine o'clock, p. m.—Tumefaction of the lips and cheek very trifling, not enough to effect the least change in the eye-lids of the right eye.

"23d.—Is in every respect comfortable.

"24th.—Eleven o'clock, a. m.—Makes no complaint; dressed the wounds; union by adhesion has taken place in the whole extent, excepting about the ligatures and sutures. Suppuration having come on about two of the sutures, they were removed. Pulse about one hundred and twenty. Renewed the adhesive straps with lint interposed between them and the wound, and the double-headed roller.

"25th.—Every way comfortable. Pulse one hundred and twenty.

"26th.—Says she has no complaint to make. Pulse eighty. Directed her to take a small dose of sulphate of magnesia.

"27th.—Speaks audibly, and says she is very well; pulse about eighty-four.

"28th.—As well as before; dressed the wounds; removed the two sutures at the upper part near the ear; wounds appear healed at every part, except where the ligatures remain upon the arteries. Pulse eighty.

"29th.—Feels very well; speaks distinctly; takes freely of soup and other thin food: pulse one hundred.

"December 3d.—Ligature from the carotid came away and the other three ligatures from the upper wound. A small collection of matter was evacuated from under the integuments in the lower wound, which was produced by the irritation of the ligature.

"4th.—Speaks and swallows very well; wounds just healed. Has used for some days a wash of spirits and water to the mouth with a view to correct some fœtor of the saliva, and cleanse the mouth.

"6th.—Found her dressed and sitting in an adjoining room, reading by the fire; looks and says she is very well. The bandages being all left off, the only deformity apparent is a little more tume-

faction of the right cheek than the left; wounds just well; can move very readily the sound half of the under jaw. Permitted her to chew some animal food.

"10th.—Wounds all healed—makes no complaint.

"March, 1822.—To-day having visited her, I found scarcely any perceptible deformity. The right cheek appeared, upon close examination, to be a little more depressed than the left. I felt from within the mouth some osseous deposit to have commenced at the two situations at which the bone was divided. Her health in every respect is perfectly good, and she enjoys the free use of the left side of the lower jaw.

"November 5th.—I have repeatedly heard of and seen the patient during the past season, and she continues to enjoy uninterrupted health."

No. II.

"A. B. aged four years, had a severe fall upon her chin, which loosened the lower incisors; they became black. The whole substance of the jaw in front began to swell soon after, upward and backward, till the swelling filled the mouth, and downward and forward, so as to produce most hideous deformity. The skin of the chin and lower lip was greatly attenuated, and protruded downward by the tumour, so as to overlap the os-hyoides and thyroid cartilages. The vessels were

considerably enlarged; the arteries beat actively on almost every part of the surface. The part of the tumour which projected out of the mouth, and was uncovered by the lip, presented precisely the appearance of an enlarged tongue; the parents declared that every physician who had seen it before, had mistaken it for the tongue, which was not easily discovered, even by the closest inspection; for it was pushed backward by the tumour into the upper part of the pharynx. The lymphatic glands did not appear affected. The child's general health was declining fast.

"An incision was made from the left commissure of the lips downward, and backward over the anterior edge of the mastoid muscle, so as to command the carotid in case it should become necessary to secure it. The anterior edge of this incision was then extended forward by a bold and rapid dissection, till the whole surface of the tumour was uncovered round to the opposite side. Though numerous arterial twigs bled, he did not stop to meddle with them, but proceeded at once to secure the facial artery on each side, just as it emerged from the submaxillary gland beneath the jaw. As this supplied nearly all the divided twigs, the hæmorrhage immediately ceased. The surface of the sound bone being next exposed behind the tumour, the metacarpal saw was applied on each side, so as to divide the bone just in front of its angles. By pressure in

front, the whole tumour was turned outward from the mouth with a crash, and carefully dissected from the under surface of the tongue, and submaxillary glands and muscles on each side. A part of the sublingual glands, and a considerable portion of the left submaxillary appearing to be tumefied and somewhat discoloured, he removed them by the scalpel.

"Only three more small twigs, probably branches of the lingual artery, required to be secured. Not more than six or eight ounces of blood were lost; the patient did not faint. The huge flap, or rather pouch of skin was re-applied, and the edges of the first, and only incision, were retained in apposition by three sutures and some strips. The large cavity left beneath the tongue was partly filled by lint, bent into the shape of the lost circle of bone, upon which the pendulous integuments were afterwards lightly braced by a bandage. The wound healed in less than three weeks, internally and externally. The divided extremities of bone shot out a luxuriant crop of granulations, which have since become ossified, so as to extend the angles of the jaw nearly an inch on each side towards the point formerly occupied by the chin. The girl speaks and eats nearly as well as ever, and goes to school every day in good health and spirits."

THE END.

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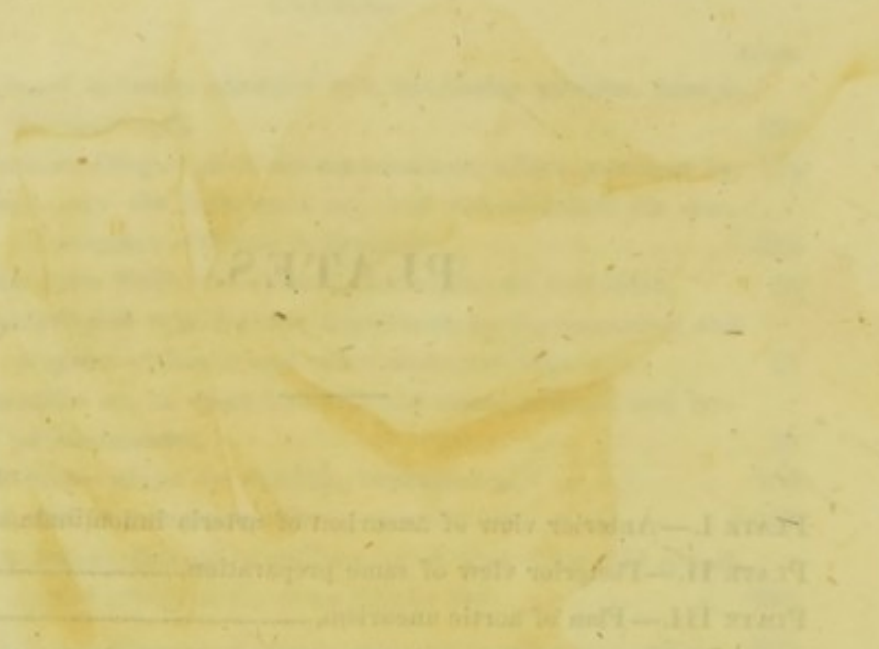
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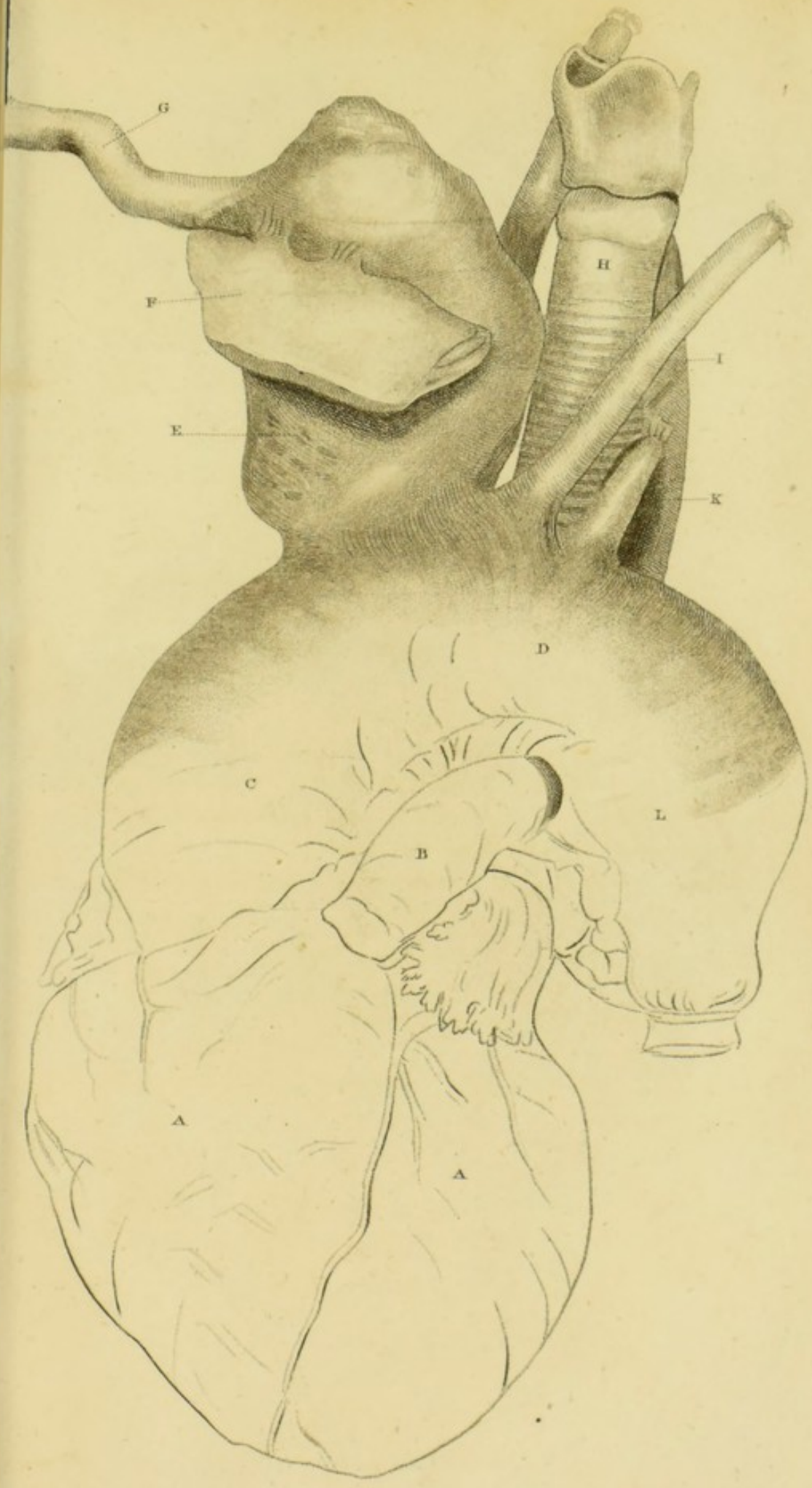
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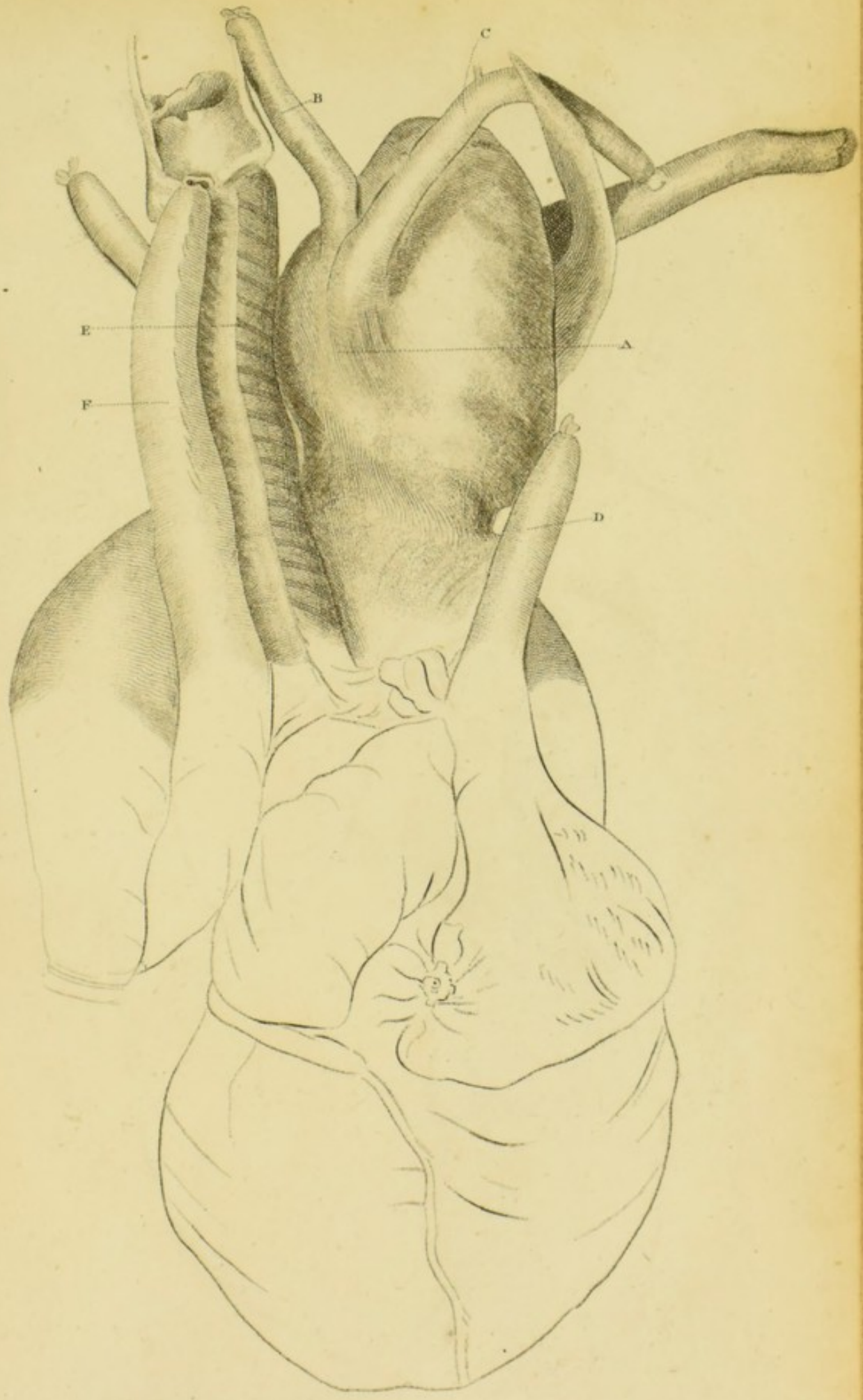
PLATE X.—View of the relations of the rima glottidis, ... 408





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F
D


A
B
C

Fig. I.

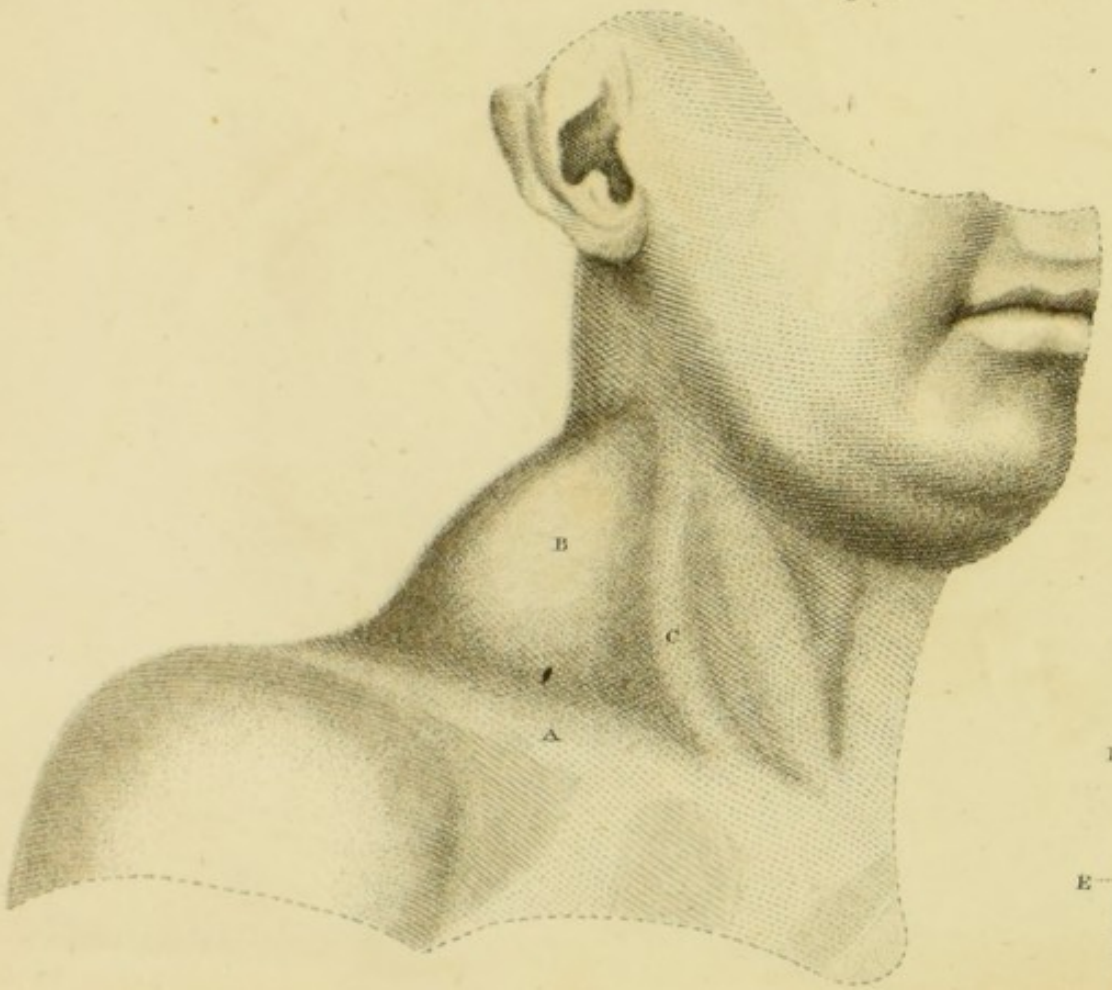
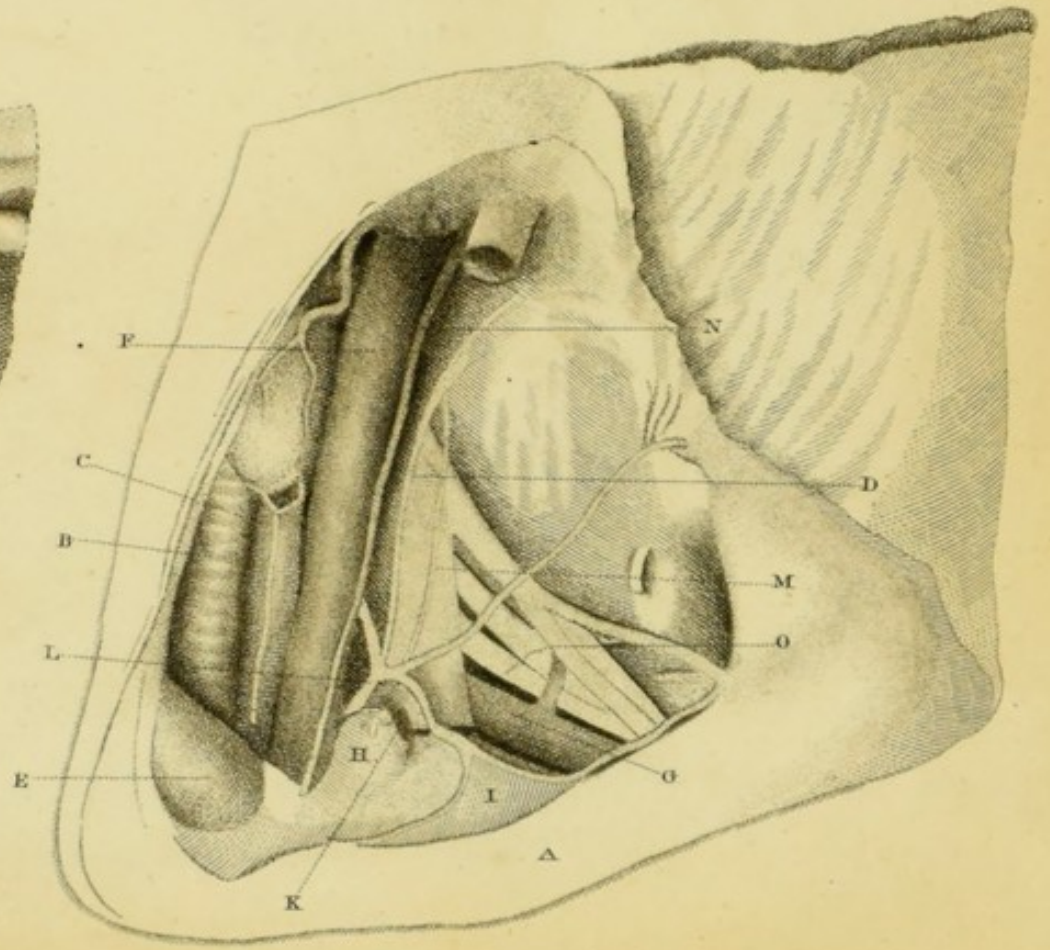
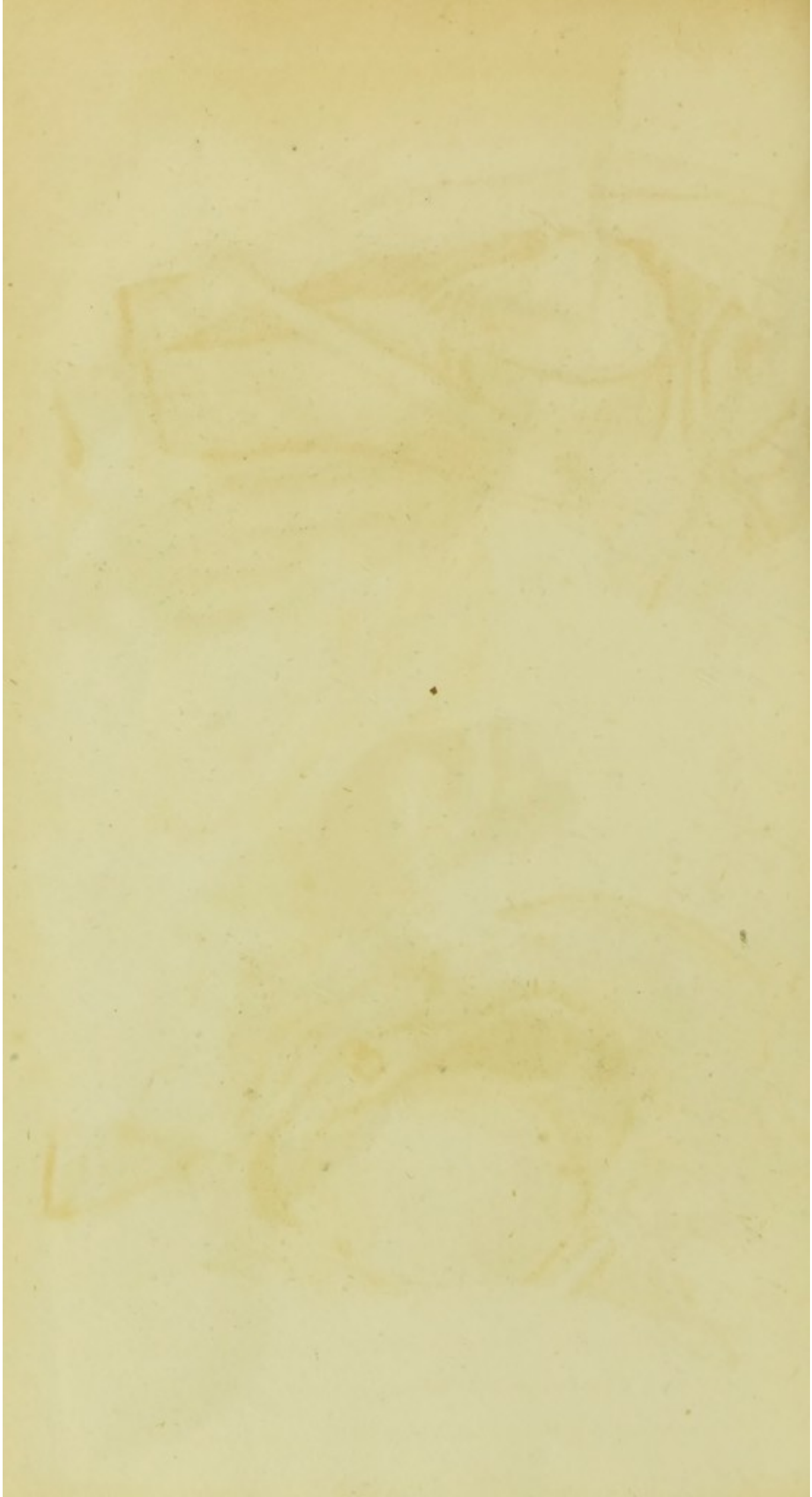
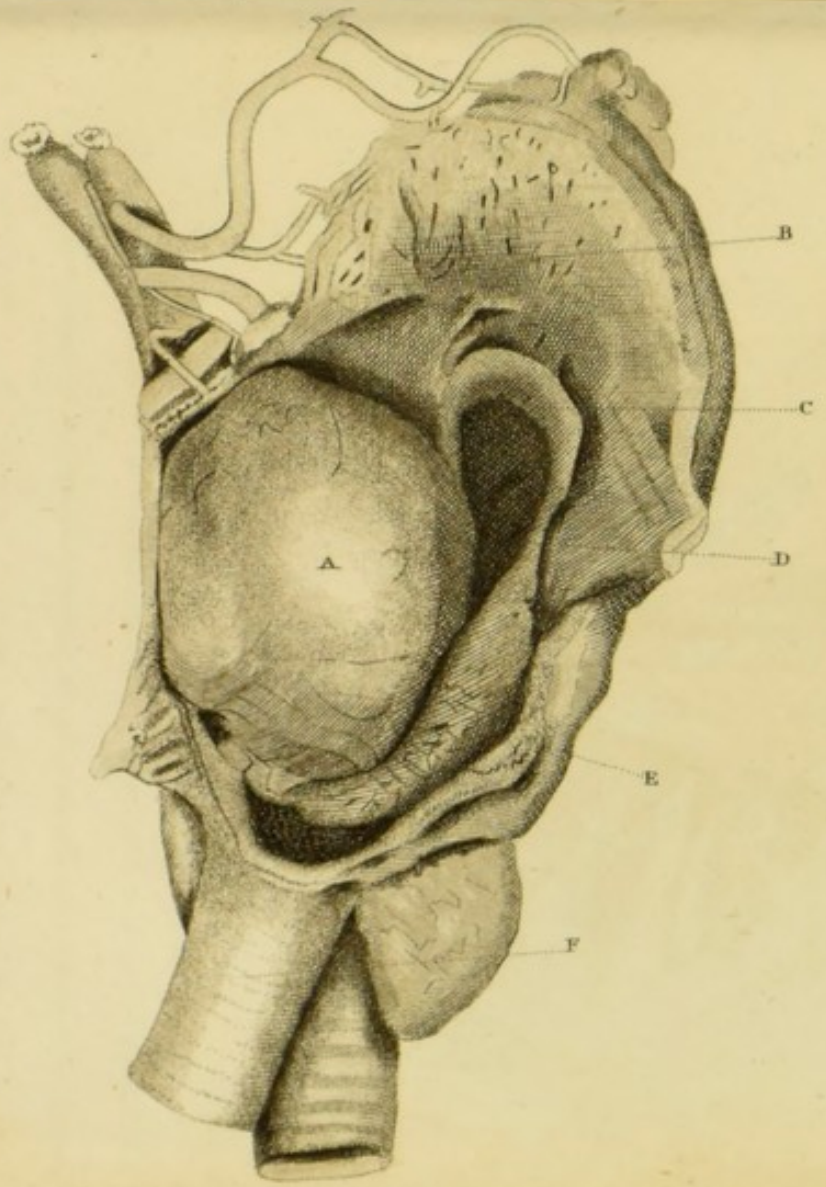
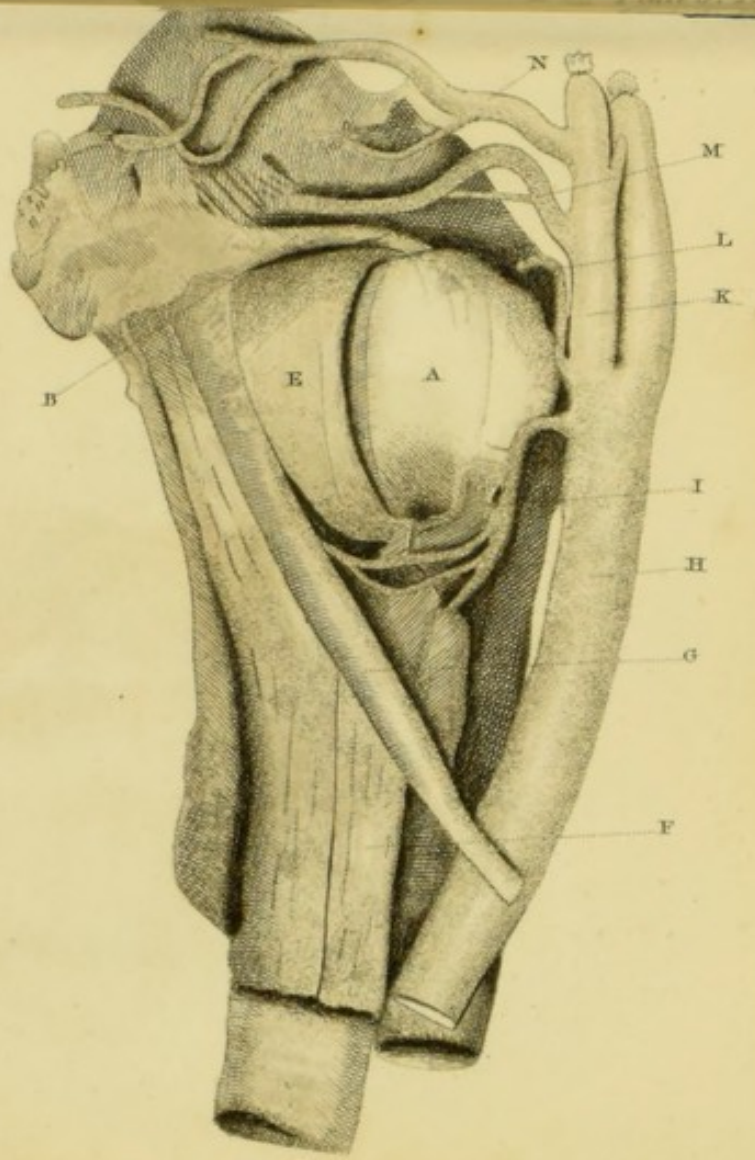


Fig. II.





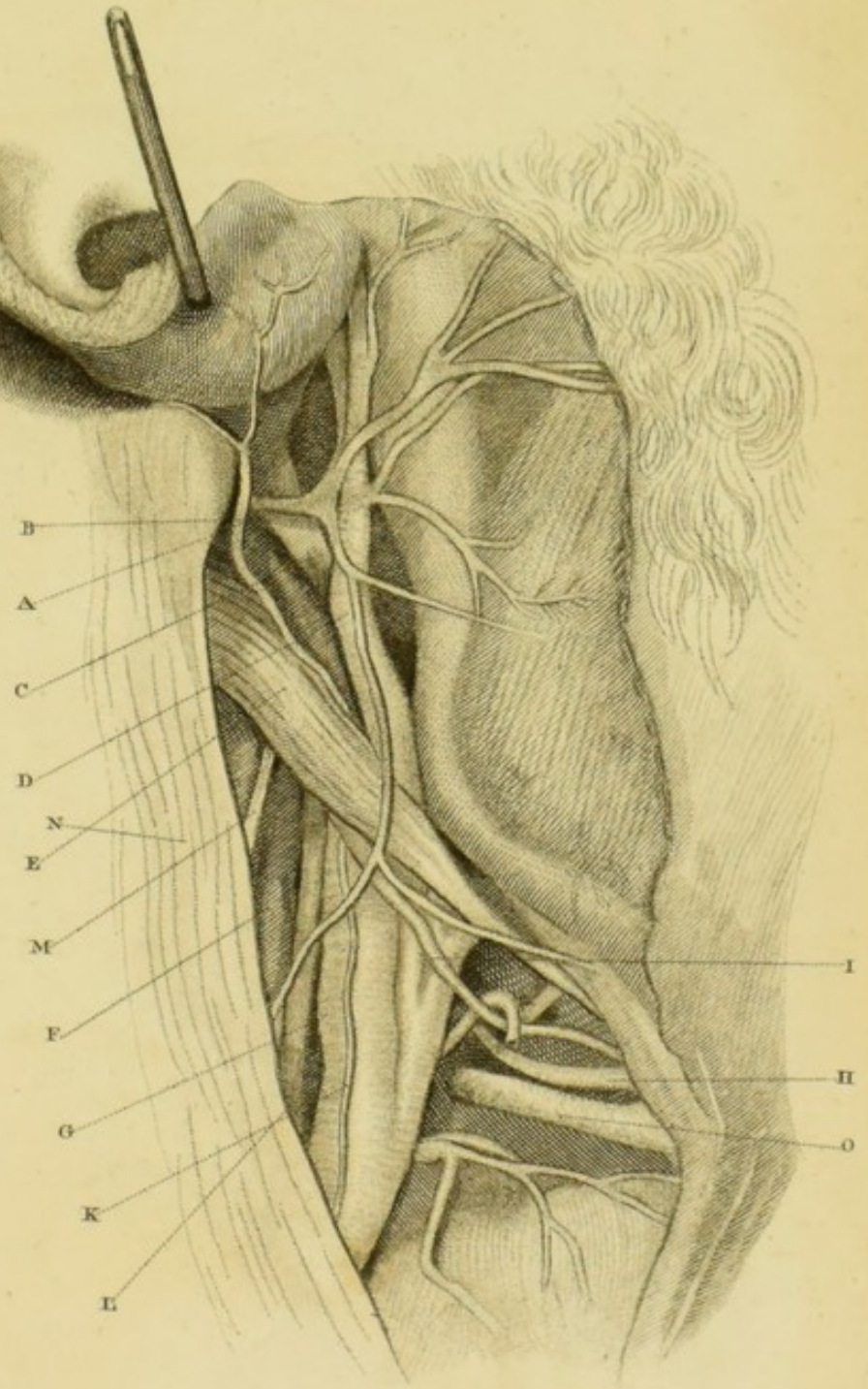




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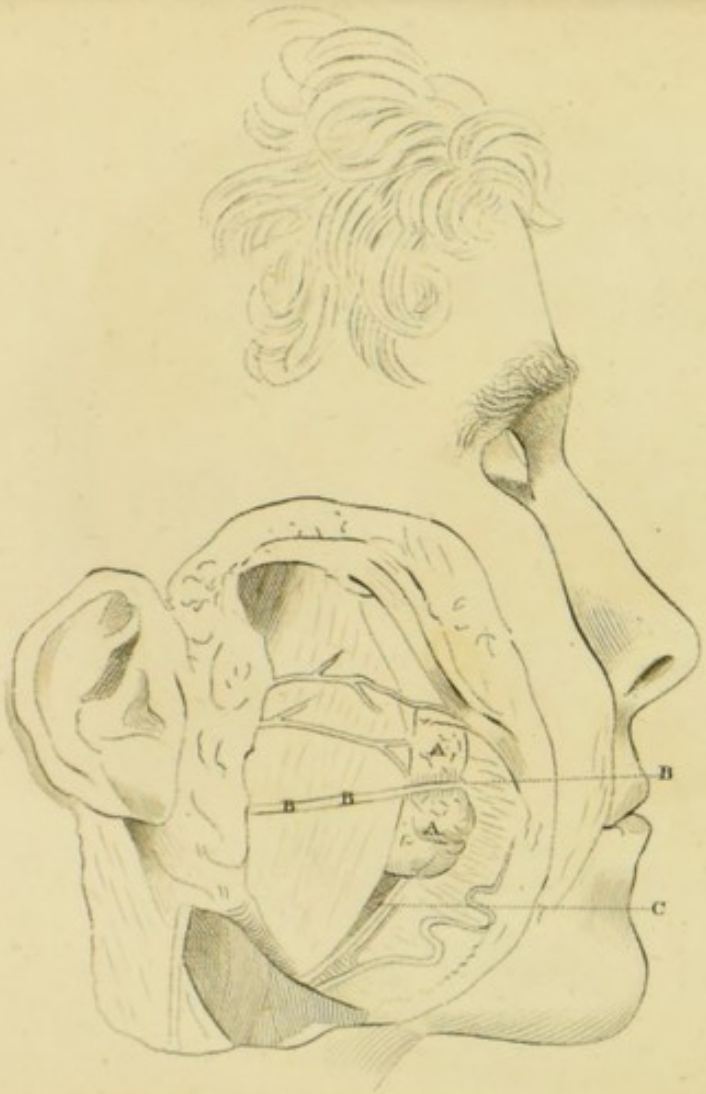




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A The Portio Dura, crossed at the root of the Mastoid process by B the Arteria posterior auris, and lying on the fo
part of C the Styloid process, and D the External Carotid Artery. E the digastric muscle. F the Internal Jugular Vein
G the Internal Carotid Artery. H the Lingual Artery exposed by the removal of the Hyo-Glossus muscle. I the
Lingual Nerve sending off K the ramus descendens noni. L Nervus Vagus and M the Spinal Accessory nerve
entering N the Sternomastoid muscle. O the horn of the Hyoid bone.


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B
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C

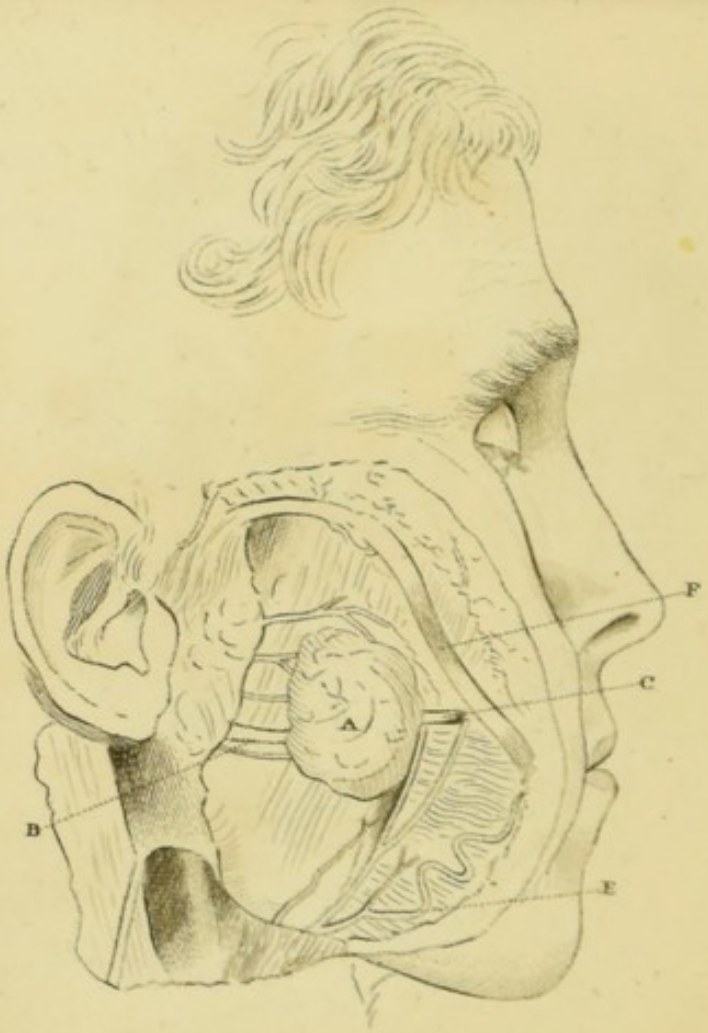
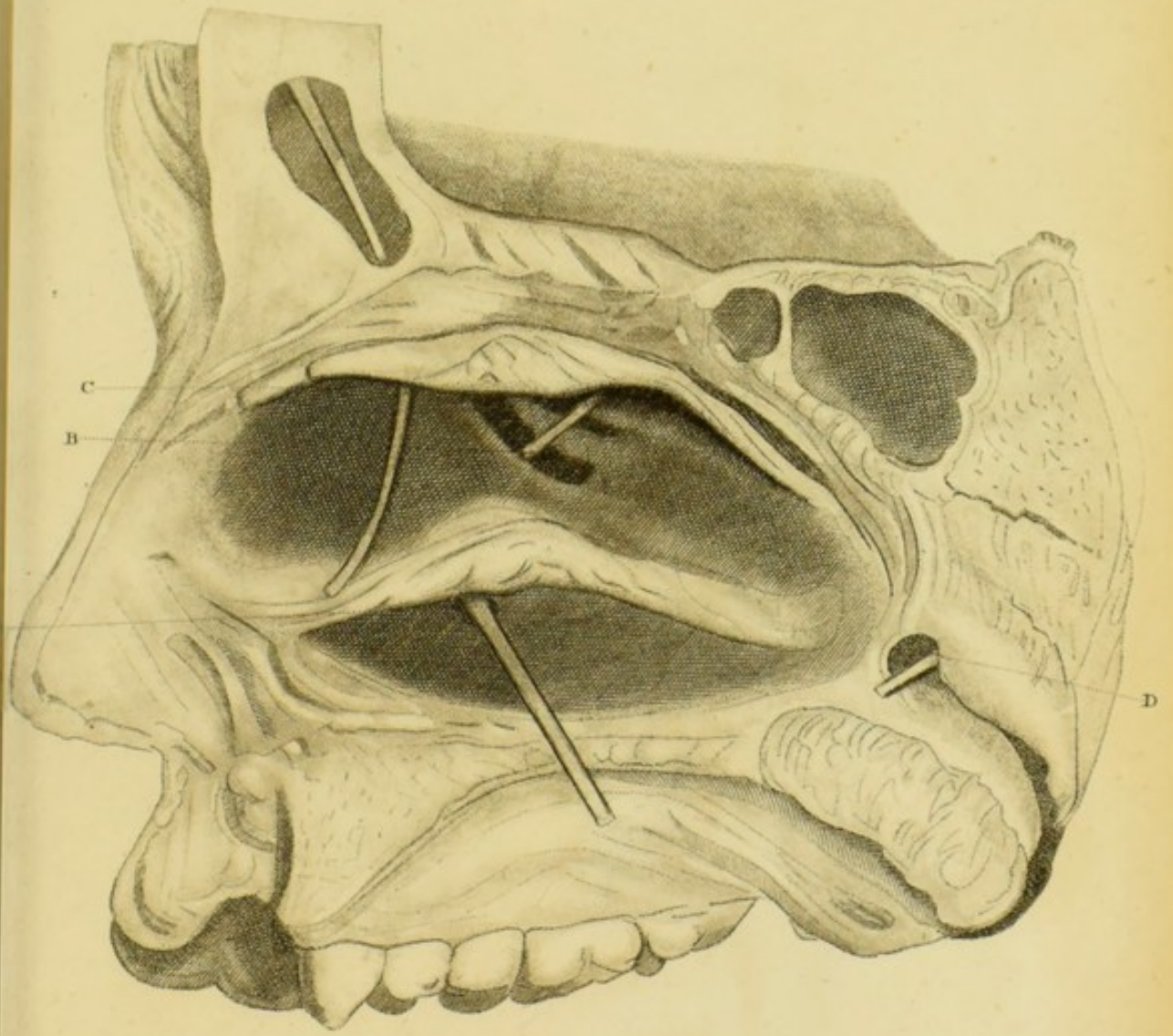

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Fig. I.



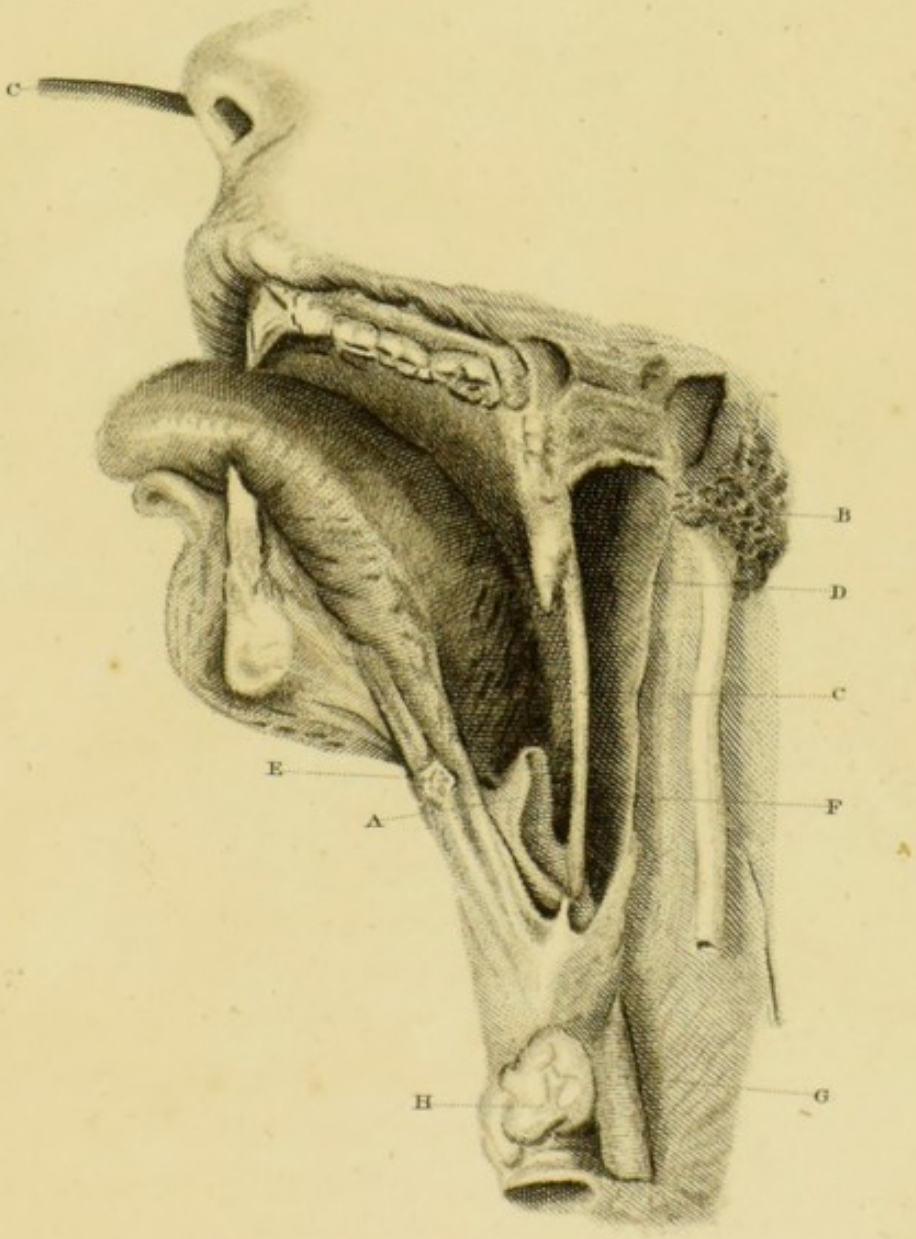
Fig. II.





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