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VOLUME XCIV.

J. F. Burghard
from the Author
Aug. 1886

CLINICAL SURGERY.

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EXTRACTS FROM THE

REPORTS OF SURGICAL PRACTICE

BETWEEN THE YEARS 1860—1876.

BY

DR. TH. BILLROTH,
PROFESSOR OF SURGERY IN VIENNA.

TRANSLATED FROM THE ORIGINAL, AND EDITED, WITH ANNOTATIONS,

BY

C. T. DENT, F.R.C.S.,
ASSISTANT SURGEON TO ST. GEORGE'S HOSPITAL; SURGEON TO THE BELGRAVE HOSPITAL FOR CHILDREN.

WITH NINE LITHOGRAPHS AND TWENTY-NINE WOODCUTS.

THE NEW SYDENHAM SOCIETY,
LONDON.

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EDITOR'S PREFACE.

The work, of which an abridged translation is contained in the following pages, consists of four volumes of Hospital Reports, and relates to Professor Billroth's surgical experiences between the years 1860 and 1876. The work in its entirety comprises some eighteen hundred pages. To reduce this within the prescribed limits of the present volume has been the chief difficulty of my task, and it has not been accomplished without sacrifice. I am conscious, indeed, that the original Reports have been strangely altered in shape, not only by a sort of literary foreshortening, but further by the necessary process of collating the several volumes. A considerable amount of rearrangement was inevitable, but the general plan of the work has been adhered to. In the text I have usually indicated the volume from which the matter is translated. Thus, "Z. B." signifies the Reports from the Zürich Hospital, and relates to experience between 1860 and 1867; "W. B." stands for the Reports from the General Hospital in Vienna between 1868 and 1876.

The Introductions and Prefaces to the various volumes, though well worthy of perusal, have been uniformly omitted, for they would have been out of harmony with the work as altered. I felt less compunction in leaving out this portion of the work, for the greater part of these Introductions is occupied with the discussion of statistics. Now, the Statistical Tables, and with them many incidental remarks bearing on the subject, save those contained in Chapters XVIII and XIX have all been cut out. At first sight it might seem irrational to omit almost wholly a portion of the work to which the most prominent place is assigned by its author, and to

discard a subject which forms really the backbone of the volumes. But I did so on two grounds. One is, that the statistical tables in question are readily accessible and intelligible in the original work; another, that without any expression of opinion on my own part, I feel fully the force of a sententious remark made by Prof. Billroth himself—"So ist die Statistik wie ein Weib, ein Spiegel reinster Tugend und Wahrheit, oder eine Metze für Jeden, zu Allem zu brauchen."

For the assistance of those who may wish to avail themselves of these admirably compiled statistics, a special chapter (XX) has been inserted containing full references.

In a few instances I have added cases or remarks of especial interest which were published separately in various journals and archives, and which are only referred to in the main work. From the same sources I have endeavoured to bring the volume as far as possible up to date by means of short notes describing any recent modifications adopted in operating, etc. Additions have thus been made on the subjects of ovariotomy, litholapaxy, carbolic-acid poisoning, extroversion of the bladder, talipes, and others, all of which will be found in their proper places in the text.

The present mode of conducting antiseptic operations in Prof. Billroth's clinic is, briefly, as follows:—No spray is used. Carbolic acid is the antiseptic agent employed, in solutions of 1, 3, or 5 per cent. The instruments and sponges (especial care being taken with the latter) are rendered thoroughly aseptic. Silk ligatures are found to answer best; the threads are boiled for one hour in 5 per cent. solution of carbolic acid before use. The ends of the ligatures are cut off close to the knot. Unless suppuration takes place, which is of rare occurrence, the ligature knots do not come away. No protective is laid on the wound; the first layer of gauze is damp. Before use, the gauze is soaked in the following mixture:—Spirit $3\frac{1}{2}$ pints; colofonium 14 oz.; glycerine $3\frac{1}{2}$ oz.; carbolic acid $3\frac{1}{2}$ oz. It is then wrung out and is ready for use almost directly. The entire preparation of the dressings occupies about fifteen minutes. The Lister's mackintosh is replaced by a special soft, impermeable material of a less expensive nature. The dressings are, as a rule, changed for the first time on the fifth day. The drainage tubes are then removed and the second dressings allowed to remain on for five or six days, at the end of which period the special antiseptic precautions are usually discontinued.

For the above information I am indebted chiefly to the courtesy of Dr. Johann Mikulicz, of Vienna, assistant in Prof. Billroth's clinic.

An attempt to weave together materials collected from these various sources may possibly have produced something worse than mere patchwork, and have yielded a fabric unfit to stand the wear and tear of critical perusal. Of the scant justice that the present rather disjointed version does to the original volumes no one can be more conscious than myself. The task of editing the work would have been far harder had not the admirable arrangement and compilation materially lightened the labour. To the best of my power I have sought to remedy the defects arising from a rearrangement of the work by a copious index, by subdividing the chapters into sections, and by supplying full summaries at the head of each section and chapter. In this part of my task it is my pleasant duty to acknowledge material assistance from my friend Dr. C. de Lacy Lacy.

I have not scrupled to make the translation in parts rather free. Where the differences in idiom and construction between two languages are considerable, an attempt to reproduce too faithfully the original is apt to miss its mark. Sentences, which to those unfamiliar with the original language might appear merely involved, are likely to become altogether incomprehensible if done too literally into another tongue. I have aimed solely at making the translation intelligible, and constantly borne in mind Voltaire's warning: "Malheur aux faiseurs de traductions littérales! C'est là qu'on peut dire que la lettre tue!"

C. T. D.

London; July, 1881.

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Errata.—P. 8, line 7, and p. 12, line 12, *for* "Köster" *read* "Küster."

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CHAPTER 1.

ANTISEPTIC TREATMENT OF WOUNDS, AND ANÆSTHETICS.

In 1875, I first began to employ the antiseptic method regularly. In 1877, my assistant, Dr. Wölfler journeyed to England, France, and Germany, and brought back with him the most recent modifications of the method; whereupon we began afresh with our antiseptic treatment. The utmost precautions were taken to ensure asepticity, and to diminish the sources of infection. The time of making post-mortem examinations was altered; none of the servants employed about the dead-house were allowed to come near the clinic or operating theatre; all my assistants were provided with special coats, which were washed daily; special receptacles were set apart for the antiseptic dressings, and all the sponges were most carefully and thoroughly disinfected with carbolic acid and then soaked in thymol before use. I had long had an idea that some of the misfortunes met with after ovariotomy might be traced to imperfect disinfection of sponges. Professor Frisch has shown that sponges, even after they have been soaked for twenty-four hours in 5 per cent. carbolic solution, are still capable of developing organic germs. In short, in every detail, to the best of my power, I carried out Lister's and Volkmann's injunctions. Unfortunately, to some extent, this system is based on imperfect scientific knowledge, and thus a certain amount of faith is demanded of those who obediently carry out every detail.

In the beginning of 1878, the following form of antiseptic dressing was introduced into our clinic:—Two per cent. carbolic steam spray; all instruments, drainage-tubes, and silk soaked in

5 per cent. carbolic acid; silk protective on the wound; over this crumpled carbolic gauze, then a large fold of carbolic gauze and mackintosh; next gauze roller bandages to keep all in place, the edges of the dressings filled with salicylated wool, and over this, a layer of cotton-wadding. With recent wounds, all went on well at first, but then two patients—one with caries of the hip, another of the elbow-joint—were attacked with septic phlegmonous inflammation of the most severe character. The secretion of the wound was free from odour; both patients died.[1] For a time, matters went on better, but then cases of carbolic poisoning, and of carbolic eczema became so common, that I gave up this antiseptic, replacing it by thymol. Then I employed dressings containing no carbolic, but saturated with spermaceti and colophony.[2] The protective thus became unnecessary, for its principal use is to prevent the direct contact of the wound and carbolic gauze.

On the whole, I was well pleased with this method, and was able to demonstrate to those who watched our practice, that the results are just as satisfactory as could be shown in the wards of the most zealous and practised "antiseptist." Further, I have con-

[1] I have long tried to make clear to myself and others the difference between septic and phlogistic, or zymoid ferment on the one hand, and the product of fermentation—the putrid and phlogistic poison—on the other. Evidence that both elements coexist in the tissues and fluids, but are not identical, only gradually came to light. I have often maintained that the materials producing septic infection and phlogogenous inflammation could neither be gaseous nor fluid, but must be looked upon as minute atomic molecular bodies. The view that these ferments always exist in very minute organisms has been widely diffused by Lister and Pasteur, but I have shown reasons to doubt the absolutely convincing nature of their experiments (see my work on the 'Cocco-Bacteria Septica'). Now, the putrid poison—the product of fermentation—there can be no doubt, is a non-organised body, possessing certain properties which have been described by Panum and Bergmann. During the process of decomposition odorous products are often set free; such products may possess certain poisonous properties, but they are not identical with the poison, nor do they constitute it; the putrid poison is inodorous. Moreover, the part whence it arises need not have any ill smell; yet further, it may be formed from tissues to which air has not access. If a wound be free from smell there is a tolerably strong probability that no decomposition is going on in it. At the same time products may develop at the edges of the wound or in retained blood, by whose absorption pyrogenous effects may be set up. Inodorous phlogistic poisonous material is formed, for example, in connection with those acute inflammations with which we are familiar, and which originate in the subcutaneous tissues.

[2] *I.e.* black resin or turpentine boiled in water and dried.

vinced myself that the enthusiastic expressions of some members of our profession, on the subject of the new method of dressing wounds, are not to be taken too literally; "not a single drop of pus forms under these dressings," "no surgical fever—only slight aseptic rise of temperature," or again, "every resection wound heals by first intention;" or, "pyæmia in future will be relegated to the records of history." Such assurances—especially by word of mouth—may often be heard. For my part, I neither allow myself to endorse such sentiments, nor to use such expressions; nor am I unduly depressed if these wonders fail to occur. In expressions such as these, there is rather more imagination mixed up with the truth, than is altogether good. Experience will gradually show what is due to fancy, and what to actual observation.

Without venturing to assert that I have come to any final conclusion on the subject of the advantages of antiseptic dressings over other methods of treating wounds, I think I may say that practically it is an admirable method, and I shall always recommend it as safe and reliable, until some better mode of treatment has been devised. It is especially suitable for recent wounds, and for operations on tissues which are not suppurating. Cases where a septic condition exists before the operation, must be again distinguished. Thus, I amputated the thigh, for gangrene of the leg following a gun-shot wound of the popliteal artery; no part of the wound healed by first intention, and death followed a fortnight later, from sepsis. Here, the antiseptic method cannot be held answerable, nor does it exert any material influence on such cases.

Further, cases of cold abscess or caries must be considered from a different point of view. The advice sounds very beautiful and simple to extirpate all suppurating parts, as if they were particles of cancer, then to disinfect the wound with suitable applications, and treat them as if they were recent. Every surgeon who has attempted to follow such directions, knows the difficulty, nay the impossibility of carrying them out in many instances. As far as I can gather from Volkmann's 'Bericht,' and from those who have frequented his clinic, he amputates far more often for caries of the joints than I do; he has probably less opportunity, therefore, than I have had of seeing the results of resections and évidements. There are special reasons for this; among others, the people here are very loth to submit to amputation. During the last ten years, I have felt less disposed towards conservative operations for caries, and

should have amputated far more frequently if the patients or their friends had not objected. I never held myself justified in performing excision of the hip in cases where no suppuration existed, and where there was only fungous synovitis, or slight ostitis of the upper end of the femur. Nor do I often feel it right to undertake the task of removing every suppurating part from some anæmic, miserable child, the subject of knee- or hip-joint disease with extensive suppuration. In such operations, however, I freely admit that the antiseptic method often has one advantage, viz. that the immediate results after operation are much better than they used to be under our old systems. Nowadays, there is good prospect of temporary benefit when the patients are weakly, or even decidedly tuberculous. Formerly, we should not have thought of operating, for fear of the severe suppuration that would inevitably follow. Still, treat these wounds as you will, sinuses will be left, and the ultimate results will be almost as unsatisfactory as they used to be. The same applies to évidement of carious bone about the hand or foot; two or three weeks after the operation, the wounds will be in just the same condition as they were with our old-fashioned dressings.

In a few instances I have opened and treated antiseptically, cold, congestive abscesses connected with diseased spine; I have not seen any of these abscesses close up very rapidly, and the patients ultimately left in much the same condition as if the abscess had been allowed to open spontaneously. Again, in chronic suprafascial abscesses about the back or thigh, in one or two cases I laid the cavity freely open, scraped the walls, united the wound by sutures, inserted a drainage-tube, and employed antiseptics. One case only healed up soundly, and remained so; in all the others the cicatrices broke down, and fresh suppuration followed from the sinuses; nor did I perceive any advantage over simple puncture and drainage. Reluctantly, therefore, I have come to the conclusion that the antiseptic method is of no material advantage in assisting our endeavours to convert these chronic ulcerative processes into simple traumatic lesions. A large proportion of the patients who come under my care are affected with such complaints: this fact must excuse my inability to manifest any true enthusiasm for a method of treatment which is best adapted to cases I am seldom called upon to treat, viz. severe injuries.[1]

[1] In the year 1877, among 20,105 patients admitted into the hospital at

On one point I wish particularly to insist, viz. the absolute importance of carefully watching patients treated antiseptically. I have never felt so much anxiety in any other operation cases, for if they do not go on perfectly well they generally go utterly to the bad. When, in "aseptic" cases, septic phlegmonous inflammation is set up under an occlusion-dressing, the same thing happens as when the abdominal wound is completely closed after laparotomy, that is to say, so much toxic inflammatory and infective material is generated that the patient will die in spite of all incisions. It is of the greatest importance, though a matter of some difficulty, to recognise this state of things in the early stage. As often happens in septic poisoning, the temperature may be either at, or even below, the normal; but if the patient's expression be altered, his tongue clammy, the condition drowsy, the pulse rapid, the symptoms ought never to pass unnoticed, for they betoken a most dangerous condition. The wound may be opened at this stage; there will often be no ill smell. If the phlegmonous inflammation has commenced in the subcutaneous cellular tissue, it will be recognised by a slight brownish discoloration of the cutis near the wound. If the deeper parts be attacked, there will be no positive evidence. Formerly I thought that under the antiseptic treatment such phlegmonous inflammations might subside, and so persevered in the treatment; thus I lost many patients. It is of the utmost importance to recognise the moment when the antiseptics should be discarded. In former times the surgeon felt that he could do something himself for operation cases by careful watching and supervision; but nowadays, so much depends upon the hands and clothes of assistants and nurses, and on the intelligence of the workmen who manufacture the dressings, that the surgeon, though

Vienna (the K. K. Allg. Krankenhaus), there were but 17 with complicated fractures of the leg. Again, at the Rudolf-Spital, in Vienna, 17 cases of fractured leg simple or otherwise were recorded during the year 1874, out of a total of 5775 admissions. The small number of these and other severe injuries is accounted for, according to Prof. Billroth, by several reasons. Thus, in Vienna there are no large iron manufactories. The railway companies have their own special hospitals. Again, the Viennese working man is as a rule careful, and rarely drinks to excess during the working hours. In Northern Germany dram drinking (schnaps) is far more common. There the men are seldom actually intoxicated while at work, but they have strong liquor constantly by them. Severe injuries are much more common in Northern Germany. It is to be feared that the experience in our English hospitals fully bears out Prof. Billroth's suggested explanations.

answerable for the fate of his patients, often has not the circumstances wholly under his control. The proper management of cases under the antiseptic system is the most difficult task I have ever attempted; still, this shall not deter me from doing my very best to perfect the system.

Anæsthetics.

At the end of the year 1878, I had had a quarter of a century's experience in operations; more than six years as assistant, and the rest of the time in the charge of my own clinic. During this period I had seen chloroform administered some 6000 times, with two cases of death.[1] Up to the end of 1870, I always employed chloroform alone as an anæsthetic: since then I have used a mixture, consisting of three parts of chloroform, one of sulphuric ether, and one of alcohol. With this anæsthetic I am perfectly well satisfied, and have not seen any asphyxia or syncope result from its use; the mixture seems to me merely of service in diluting the chloroform. My two assistant surgeons and my eight assistants undertake the post of chloroformist for a month at a time, in regular rotation. On this account, again, I think it more prudent to use diluted chloroform. No doubt the pure chloroform produces anæsthesia more rapidly than this mixture, but, on the other hand, the latter is less apt to excite vomiting.

[1] Reported the 'Wien. Med. Woch.,' 1868, p. 762; and 1870, No. 16.

CHAPTER II.

CARBOLIC ACID POISONING.

Many men are in the habit of denying rare, but unpleasant occurrences until they themselves have experienced them; the peculiarity is not uncommon. There are many surgeons sceptical on the subject of death from chloroform; may it be their good fortune never to be undeceived. So, again, the number of those who disbelieve in death from carbolic-acid poisoning is by no means small, and yet death from carbolic acid is far more frequent than from chloroform.

During the time that I employed solutions of chloride of lime and acetate of alum as antiseptic agents, I had reason to be gratified with the success to which I could fairly lay claim. Cases, however, occurred at times when I was less satisfied with the efficacy of these materials, especially when used in concentrated solutions. I found then that superficial eschars were formed, and the discharge of the secretion from the deeper parts was hindered. For a long time past I have devoted my attention to the subject, and, at my request, Dr. Gersuny[1] and Dr. Steiner[2] tried some experiments with solutions of carbolic acid and chloride of zinc. The results of their investigations were, briefly, as follows:—"Both agents were found, unfortunately, to be thoroughly efficacious antiseptics only when employed in highly concentrated solutions. When so used the cellular tissue and the coats of the vessels were corroded; such effects in large hollow wounds, especially in the axilla, might entail very serious consequences. Weaker solutions were found powerless to check decomposition of the secretions in recent hollow wounds, still less where the suppuration had already lost its healthy character." These investigations were published at the end of 1871 and the commencement of 1872.

[1] 'Arch. für Kl. Chirurg.,' Bd. xii, p. 814.

[2] 'Wien. Med. Woch.,' 1872, No. 28.

Clinical observation subsequently confirmed them in every particular. At this time it was not known that the absorption of carbolic acid by a wounded surface might produce fatal results. At my request some of my pupils prosecuted researches on the subject, but they were discouraged by the uncertain results with regard to the toxic symptoms, and also by their failure to demonstrate any distinctive pathological appearances. Köster, in a very laborious essay,[1] has treated the subject at great length, but I see from his experiments that he got no further than we did. The subcutaneous injection of concentrated solutions led to rapid and extensive sloughing of the skin and cellular tissue, and most of the animals died from these causes, some with high, some with low temperatures. No decided results were obtained by injecting weak solutions of carbolic acid. The injections, if repeated frequently, caused suppuration and rapid emaciation, and led to such complicated conditions that it was found impossible to estimate accurately, or discriminate with precision, the appearances manifested. The animals experimented upon were carefully examined after death, but no evidence could be gathered to settle with certainty whether in man death was due to absorption of the carbolic acid by the skin or the cellular tissue.

The poisonous properties of carbolic acid would scarcely have been so soon recognised had not the olive-green discoloration of the urine constituted a symptom too obvious to be overlooked. If all substances which are excreted by the urine caused alteration of colour in that fluid—if, for instance, the urine or saliva were always black when they contained iodine—the appearance would not lead to apprehensions of poisoning. The symptom is one on which I must dwell for a short time.

According to my experience, there can exist no doubt that the discoloration of the urine affords no reliable test of the amount of carbolic acid absorbed, but may depend on the idiosyncrasies of the individual. The fact that the olive-green colour of the urine proves that carbolic acid has been absorbed is almost beyond question. Let us imagine, however, two individuals subjected, under precisely similar conditions, to the action (external) of equal quantities of carbolic acid; in one the urine might be normal in colour, in the other green; yet it would hardly be correct to assume that in the first case no carbolic acid

[1] 'Arch. für Kl. Chir.,' Bd. xxiii, p. 117.

had been absorbed. We should more properly conclude that, in such a case the carbolic acid was not excreted at all, or, at any rate, in quantities too small to colour the urine green. Again, in such an individual the substance might not be excreted through the kidneys, but through the intestines, skin, or lungs. People are in the habit of looking upon all such matters as being far simpler than they really are. Undue stress is laid upon the amount of the poison absorbed. I grant that here, also, idiosyncrasies should be taken into account, but it must not be forgotten that these may be the very causes that explain the diverse capability of excretion. One case was under my observation (a case of empyema, in which 1 per cent. carbolic solution was allowed to run through the pleural cavity for twenty-four hours), in which the urine was still green fourteen days after the carbolic had been discontinued. In this patient not only had the carbolic acid been entirely abandoned, but thymol had been substituted with the best results. This case also showed that carbolic acid may sometimes be retained in the body for a long period; it might, therefore, not unreasonably be supposed that this substance acts as a cumulative poison on the organism. True, the most eminent toxicologists hold that it has no such effects, yet such would have been the case in the above instance had I persevered in the use of the acid. No doubt the experience of other surgeons coincides with my own, in the observation that the green colour of the urine (and the other toxic symptoms also) occurs at varying periods of time after operations performed under carbolic spray and the use of Lister's gauze dressings. Sometimes forty-eight hours elapse before these symptoms are observed, sometimes they are evident after a few hours. Slow absorption and slow excretion are naturally associated. If the green colour of the urine depends upon the amount of sulphuric acid contained in the organism, as we are assured by the chemists it does, then a further important point must be taken into account, viz. the quality of the food. Now, this is very different in different countries. I was greatly struck by the following extract from the journal of my assistant, Dr. Wölfler:—"It is very remarkable that although Lister, in dressing wounds, lays gauze soaked in 2½ per cent. carbolic solution over the protective, he has never seen any ill effects from the carbolic acid. In a case of chronic abscess opened and treated antiseptically (the first case so treated by him in London) the urine, to Lister's great

surprise, became of a dark reddish-brown (bierbraun) colour. He at once replaced the carbolic acid in this case by other disinfecting substances."

As I have stated above, it happens once in a way with us that the urine does not become green in cases treated with carbolic acid; such an exception is exceedingly rare; almost every patient treated on this plan has green urine. At first we paid but little attention to the symptom unless it lasted a long time, or was strongly marked. Unfortunately, several cases of severe poisoning—some of them fatal—forced upon our notice the danger arising from absorption of carbolic acid. Nor is it only in washing out the wound or using the spray, that the risk is incurred. In many persons the dry carbolic gauze dressings are sufficient to turn the urine a very deep olive green; one of my assistants had dark green urine merely from repeatedly dipping his finger (the skin of which was unbroken) in carbolic solution. True he was exposed to the spray also for some time. Dr. Wölfler, on his return from England, thought that all this might depend on the impurity of our carbolic acid, so we obtained chemically pure acid, but the results were the same. Then I procured the carbolic acid from the English manufactory which supplies Lister; the only difference seemed to be that the absorption effects were rather more severe. How are we to account for these facts? Must not the explanation be that the conditions of absorption and excretion among our heterogeneous population differ from those of the English race? As a rule, I am rather sceptical about such hypotheses, but here I can see no other solution.

In illustration of my remarks, let me here narrate three cases of severe carbolic poisoning, which, fortunately ended in recovery.

Case.—I opened a chronic abscess in the thigh of a child three years old, under 1 per cent. carbolic spray and introduced a drainage tube. Antiseptic dressings, consisting of eight layers of gauze wrung out of 5 per cent. carbolic acid, a double layer of absorbent paper, and then a thick layer of jute, were applied, and the whole was kept in position by a gauze bandage. Two hours later it was found necessary to renew the dressing. Three hours afterwards the child began to vomit, and became very restless. The sickness persisted and collapse set in. The abscess had been opened at ten a.m. and at five p.m. the temperature was 97·6°. Wine and acetic ether were ordered, and the carbolised bandage taken off. The symptoms continued through the night, and the next morning the child was completely unconscious (temp. 96°). By means of stimulants and artificial nourishment the child at length revived,

so that by 9.30 a.m. in the morning (twenty-four hours after the opening of the abscess) the temperature had risen to 99·6°, and answers could be elicited. The pulse again was perceptible (132). Collapse again occurred, however; urine and thin dark motions were passed unconsciously. By midday the temperature again sank to 97·5° and did not rise towards evening. The urine passed was now of a dark olive-green colour; towards evening the vomiting ceased. The child, though much exhausted, recovered completely by the second day, and the temperature again became normal; by the fourth day the urine was of natural colour. The abscess healed up rapidly.

Case.—In a little girl, æt. 6½, excision of the head of the femur, below the trochanter, was performed for caries, under 2 per cent. carbolic steam spray. The notes do not say whether the wound was washed out with 5 per cent. carbolic solution at the conclusion of the operation. Lister's dressings were applied and renewed after a few hours. The day after the operation the urine was of a dark olive-green colour; the patient suffered from nausea and vomited dark olive-green fluid; the temperature stood at 101·4°. Sulphuric acid was prescribed. On the third day she was lethargic and vomited black fluid. The morning temperature on this third day was 103·8°, and the evening 99·6°. Consciousness returned, and sickness ceased on the fifth day. On the eighth day the urine was of natural colour; slow convalescence followed. Immediately on the occurrence of the carbolism the Lister's dressings were replaced by thymol dressings.

Case.—A girl, æt. 6, was admitted with hip-joint disease, with abscess and sinuses. She had no albuminuria, but her general condition was very feeble. The sinuses were dilated and syringed out every fourth day with 5 per cent. carbolic-acid solution, which was allowed to escape immediately. The urine turned olive green. The upper end of the femur was resected under thymol spray, and the wound washed out with thymol solution, as carbolism existed. Lister's dressings were applied. The day after the operation the child, who was in a very reduced and anæmic condition, vomited several times; the green colour of the urine persisted. Two days after the operation the wound was dressed as before, but without the use of the spray. The patient now began to lose consciousness; the urine was passed involuntarily; the stools were very dark. Sodæ Sulph. was prescribed. Two days later the wound was again dressed in the same way as before (I thought it hardly possible that a dangerous amount of carbolic acid could be taken up from the gauze dressings when the wound was covered with protective. In former cases I had always laid the blame on the spray, the syringing of the wound, or soaking the gauze in carbolic acid). The stools were black and loose, and the patient vomited on several occasions black fluid. It was found necessary to discontinue the Sodæ Sulph. on account of the diarrhœa. During the next two days the dressings were changed daily; the motions and urine continued black. On the eighth day after the operation simple spermaceti gauze was substituted for the thymol and carbolic dressings. From this time no further symptoms of carbolism occurred. The wound meanwhile had almost healed, but

subsequently gave way again. By the tenth day the urine was natural in colour, but contained albumin. Symptoms indicative of meningitis and localised cerebral affection now arose. Clonic spasms affected the right sterno-mastoid muscle, and both the upper extremities were paralysed. Then complete sopor came on. All these symptoms, however, gradually subsided, and the albumin disappeared from the urine. The stools continued dark for about three weeks. The patient was eventually carried off by an attack of erysipelas eight weeks after the operation. Post-mortem examination showed suppuration in both thighs and thrombosis of the crural veins, and chronic encephalitis affecting the cortex and grey matter of the frontal convolutions.

I am far from ascribing death in this last case to the carbolic acid; still, I think the term proposed by Köster, "carbolic marasmus" might be applicable. All three cases above recorded were in children; intensely dark urine, black stools, vomiting of black fluid, restlessness, collapse, lethargy, were in all the cases the principal symptoms to a greater or less extent.

I have already drawn attention to the occurrence of acute serous meningitis in children after operations.[1] In these cases, however, the symptoms are different, and death takes place early. Meningitis—usually basal—is met with rather frequently in children affected with caries, but I have seldom found in such cases caseous areas in the brain substance. In the last of the three cases above given, the disease was of a most complicated form. Unquestionably, acute nephritis had something to do with it, and I have already shown the connection of this with carbolism. A recent contribution by Sonnenburg to the 'Centralblatt für Chirurgie' (1878, No. 45) sets this beyond doubt; the brain symptoms also may be due to nephritis. I do not unreservedly agree with the view that these caseous areas in the brains of children are due to "old chronic caseation." Any one who has experimented on rabbits knows that these areas may form in animals in a few days, and may be found in all the organs; the existence of a capsule will determine the age of such areas. In children they may remain latent for a long period, especially when situated in the frontal convolutions. These areas are undoubtedly the starting-point of localised convulsive movements in certain parts of the body; whether they then originate, or whether they only betray themselves more owing to œdema of the brain depending on nephritis, or whether in enlarging they give rise to symptoms of irritation, are all questions which could hardly be answered precisely. We do not know the

[1] 'Wien. Med. Woch.,' 1868, No. 1,

anatomical changes wrought in the brain by carbolic acid; if the latter gives rise to coagulation in the cerebral vessels, it may well give rise to these caseous areas, but at present the whole matter is veiled in obscurity. I pass on now to a case of fatal carbolic poisoning.

Case.—A. S—, æt. 18, was operated on for necrosis of the upper end of the tibia. She had at the time swelling of the knee. Lister's dressings were employed. The operation was followed by rapid effusion into the knee-joint and high fever. I thought that I might cut short the suppuration by washing out the knee-joint with 5 per cent. carbolic solution, adopting the method so successfully employed by Volkmann and Schede. Accordingly three weeks after the first operation the joint was punctured, and a considerable amount of flocculent pus let out. A solution containing 5 per cent. of carbolic acid and 2 of glycerine was thrown into the joint, and allowed to run out again. This process was repeated some ten or twelve times till the fluid, on escaping, was clear. All the injection appeared to return. The canula was then removed, and Lister's dressings applied. The patient recovered consciousness after the anæsthetic, but was very cold. She soon again became completely unconscious, with very small pulse. An hour and a half after the operation she was in a state of deep sopor; the pulse was scarcely perceptible; temperature 97·8°. She could not be induced to swallow anything. During the next two hours the sopor continued; the pulse disappeared, but the action of the heart was perceptible and regular; respirations frequent, rather shallow; pupils equal, moderately dilated; eyelids open, constantly moving. Slight convulsive movements were noticed in the muscles of the extremities, especially in the forearms. These increased until the hand and forearm were drawn up into a spasmodically flexed position. The temperature sank in the course of three hours to 95°. The extremities were cold and dry, while on the face and chest a cold sweat broke out. Absolutely no reflex movement on pricking the surface with the needle point. Every kind of stimulant was employed: wine and ether were forced between the closed teeth, and a little was eventually swallowed. By means of friction and artificial warmth the patient revived in a slight degree, and was able to mutter a few words, and to swallow some wine and strong coffee. The pulse again could be felt and the tonic spasms of the arms yielded, although the muscular contractions persisted. The fluids that had been taken were now vomited, but the general condition did not improve in consequence (as happens also in narcotism from chloroform). On the contrary, the collapse set in anew, the pulse again disappeared, the action of the heart became weaker and weaker, the respirations more shallow, the convulsive movements of the muscles ceased, and she died six hours after the operation.

The post-mortem examination was most carefully performed by Dr. Chiari, and the various parts of the body analysed chemically by Prof. Ludwig. My best thanks are due to these gentlemen for

the care they bestowed on a case which may be taken as a typical one of acute carbolic poisoning. The report was as follows:

"The right lower extremity somewhat enlarged in the neighbourhood of the knee-joint, partly from infiltration of the soft parts, partly from bony thickening of the tibia. In the cavity of the knee-joint some reddish fluid containing flakes of pus; the muscles of the right thigh infiltrated throughout with reddish-brown fluid smelling decidedly of carbolic. This condition is especially observed near the space between the capsule of the knee-joint and the quadriceps extensor cruris. At the upper end of this recess is a perforation, admitting the little finger, bordered by suppurating, broken-down tissue, and forming a communication between the interior of the joint and a cavity the size of an egg in the lower part of the muscle. This cavity is invested by muscular tissue of greyish-white colour. The synovial membrane of the knee is of a brownish-red colour and feels like leather. The cartilage on the femur and tibia is wanting at some points.

"The meninges and brain very pale, the latter rather wet; serous frothy fluid in the air tubes; lungs free from adhesions, œdematous, and rather congested.

The bronchial mucous membrane slightly reddened. Heart contracted, above normal size: recent clot in the cavities, muscular substance pale. Liver slightly fatty, of a pale grey colour. Spleen (240 grm.) pale, firm. Kidneys pale grey. No hæmorrhage in any of the internal organs.

Microscopic examination of the muscular substance of the thigh shows the contractile tissue partly broken up into fibrilli, partly into discs, in some parts degenerated into a finely granular detritus. In the other muscles, in the heart and parenchyma of the kidneys, the so-called "cloudy swelling" (trübe schwellung).

Chemical examination.—Prof. Ludwig, who examined portions of the liver, spleen, kidneys, heart, muscles, and some of the urine drawn off during the height of the symptoms, reports,—"In the specimens submitted to me, abundant carbolic acid was found. I estimated the amount of carbolic acid in the 74 c.c. of urine analysed at 0·297, giving 4·01 grm. in 1000 c.c."

Gladly would we eliminate all element of "luck" from successful operations. In truth a noble aim, and one for which I have always striven with all my might. But "ill-luck" we cannot get rid of; or must I regard it as a fatality that I lost my patient in this terrible manner? After hesitating for years, I had minutely followed the advice of other colleagues, and, in order to check a severe disease, adopted a method, the efficacy of which seemed already established, and from which brilliant results were guaranteed. Can it be that some of my colleagues have had similar experiences, and refrained from making them known? At the least, I trust that the death of my patient may have been the means of preserving others from such calamities.

Case.—From a patient, E. W., æt. 43, I removed a simple ovarian cyst of moderate size, under 2 per cent. carbolic hand spray. The adhesions were few and easily separated: the pedicle, which was thin, was secured with a catgut ligature and allowed to fall back into the abdomen. A drainage tube was passed through Douglas's pouch, and brought out through the vagina. Lister's dressings were used. Some blood-stained serum flowed away through the tube the next day, and 2 per cent. carbolic acid solution was syringed in through the tube. The records of the case do not accurately state the number of times that the carbolic was injected nor whether the fluid escaped again freely. The patient felt unduly weak and restless, considering the comparatively simple nature of the operation. The urine was of the usual dark carbolic colour. Four days later vomiting commenced and the urine was of a very dark green colour: the stools, too, were black. Of course, the carbolic injections and dressings were at once left off; the symptoms however persisted, and the urine, later on, became tinged with blood. Death took place on the tenth day.

Post-mortem.—Adhesions of an extensive character were discovered. No absorption of the catgut ligature placed around the pedicle had taken place, nor had the tied portion of the pedicle necrosed. The mucous membrane of the stomach and intestines was pale. Microscopically, nothing abnormal was revealed.

In two other instances the same somewhat negative results were yielded by the post-mortem examination. One was the case of a man whose thigh was amputated for a cysto-sarcoma of the tibia, and who died on the third day after the operation; the other (a man, aged 74, who was extensively burnt about the body) died the day after the employment of the carbolic and Lister's dressings, five days subsequently to the primary injury. In this latter case the state of the urine is not recorded; rapid collapse and a temperature of 95° preceded death.

The pathological appearances after carbolic-acid poisoning are so equivocal, seeing that we know nothing of the conditions which conduce to death, that we can no more frame a purely anatomical description of carbolic poisoning than we can of chloroform poisoning. We are limited, therefore, to combining the initial effects of the carbolic acid with the symptoms ushering in death, and in this way to form, from a clinical point of view, a conception of the disease.

Those who have perused what I have written above, will not be surprised at my inability to develop any great enthusiasm for the antiseptic method, from which hitherto the employment of carbolic acid could not be dissociated. We have an old saying, that men are wiser on leaving the council, and no doubt many will shrug

their shoulders when I state the conclusions that I have arrived at after an experience extending over several years.

Now the danger arising from carbolic-acid poisoning has only been properly appreciated during the last few years. At first, every one was carried away with enthusiasm at the wonderful success of the Listerian system; for my own part, I hesitated to ascribe the effects in many of the above-recorded cases to carbolic poisoning, fearing lest, in weighing these cases, I might be prejudiced by a mistrust of the antiseptic system, founded on theoretical grounds. I do not doubt that anæmia, childhood, old age, and weakly constitution are to be taken into consideration in forming a judgment. Although my mistrust of the antiseptic system begins to melt away in the face of successive favourable results, and I can now (from having seen more cases) take a wider view; yet there is no question in my mind that in all the instances given above, carbolic poisoning decidedly caused death, though perhaps in some of the more weakly patients it merely sufficed to turn the scale.

Not long ago, at a banquet in Vienna, Marion Sims spoke in highly flattering terms of our clinics and hospitals; in particular he found the mortality in the lying-in department so small that he said, "It is no more mortality, it is accident"—a graceful, well-meant, and consolatory remark, ἔπεα πτερόεντα for the antiseptic enthusiasts! It is to be regretted, however, that "accident" is so frequently fatal, that the term is almost convertible into "mortality."

See Appendix I, infra.

CHAPTER III.

HOSPITAL GANGRENE (DIPHTHERITIC INFLAMMATION OF WOUNDS) AND PYÆMIA.

I MET with no cases of this nature while at Zürich. Ten came under my care while I was at Vienna, between 1867 and 1876, but five of these did not originate in the hospital; all recovered.

Hospital gangrene differs so essentially from erysipelas and phlegmonous inflammation, and is so widely dissimilar in its course, that we are justified in the supposition that it has a separate and and special cause of origin.

With regard to its etiology, probably the majority of surgeons hold the same opinion as they do of erysipelas and diphtheritis, that is to say, they suppose it may either originate spontaneously, or by contagion. I have not seen much of the disease, but my observations have led me decidedly to the conclusion that, in hospitals, the disease almost invariably spreads by contagion; and, secondly, that the contagious material—whatever it be—is of short life, tolerably definite action, and is easily destroyed.

With regard to the first point, there is, according to my experience, among the ordinary forms of septic conditions of wounds and ulcers, none which can set up the rapidly progressing phagedænic disease known as hospital gangrene. As yet it has not been found possible to produce hospital gangrene experimentally. I still hesitate to accept unconditionally the assurance of our best observers, that zymotic germs have much to do with the causation of erysipelas, diphtheritis, septicæmia, and pyæmia; but in hospital gangrene there appears to be no doubt that the disease is so caused. Not only is this shown by microscopical examination of the pulpy tissue and the edges of the ulceration, but also by the manner in which the process begins and spreads in the wound.

The manner in which the tissue is destroyed is so peculiar that I cannot but believe that this disease is due to some special kind of

zymotic germs, and that these germs, once fully formed and transferred to a wound, readily increase and develope in the same way. At one time or another, however, this fungus, however specific its nature, must have originated *de novo*, though how the genesis took place we can scarcely even guess. Floating everywhere in the atmosphere are germs which may develop various properties, according as the conditions in which they are placed prove favourable to such development, such, for instance, as the degree of moisture and the like. We can conceive that these germs may develop in the acid fermentation of pus, or in the alkaline deposits on the edges of vessels containing urine; then they become dried up again, placed under congenial conditions they germinate, and undergo certain metamorphoses; thus, the process goes on until finally, having passed through a complicated and probably an ever slightly-varying cycle of changes, they acquire those properties by virtue of which their activity reaches a maximum, and by which the tissues are so rapidly eaten away and destroyed. This view is in accordance with those theories which would refer all these germ diseases as far as possible to one original source—perhaps the penicillium micrococcus. The infrequency of hospital gangrene renders another explanation possible, viz. that this is a rare form of micrococcus, and is only introduced into hospitals now and again in the linen or cotton fibre of the bed coverings or horse-hair mattresses, or in straw palliasses. No doubt these views will, before long, be modified; the investigation of the problem is unquestionably of great interest, and I should have applied myself more closely to the subject, or persuaded my pupils to do so, had it not been dangerous to our patients. Being confident that hospital gangrene was readily amenable to treatment, I requested on one occasion that I might be entrusted with the care of the patients so affected. The consequence was that the disease attacked a patient in one of my own wards. It does not do to play with fire even though one should be a member of the fire brigade.

As to my second statement, viz. that the contagious material is definite in its action, I support this assertion on the observation, that the infective power is comparatively weak, forasmuch as the contagious material is not so much transferred through the atmosphere or by a third person, as directly from one case to another. Many may dissent from this opinion, but they will probably agree with me that the contagious material has but a short life, and is

easily destroyed. We know it can readily originate, and if, like the contagious material of erysipelas, it were hard to destroy, I should have found it impossible to prevent the spread of hospital gangrene in my wards.

Seven cases came under my care in Vienna during 1868; one of the patient was admitted with a wound in the forearm, which had been attacked with the disease in a typical form. Probably from this case two others became affected; in one instance the diphtheria originated, to all appearance, spontaneously, but fortunately did not spread. In another the diphtheritic inflammation of the wound was associated with septicæmia, and in two others with pyæmia, while in one patient in whom the lower jaw had been partly resected, the wound was attacked with diphtheritic inflammation, the affection subsequently spreading over the throat.

The toxic material which sets up diphtheritic inflammation of wounds is, as I have said, very peculiar in its nature; it is allied to the toxic material causing diphtheritic inflammation of the mucous membrane, and to septic phlegmonous inflammation, but whether it be identical cannot yet be answered. To my thinking, the number of these cases in our hospitals is far too large, for if perfect cleanliness and purity be insisted upon in the atmosphere, in the bandages, and the hands of the dressers and operators, the disease may be entirely eradicated and does not readily reappear when once banished. One cannot say the same of erysipelas, phlegmonous inflammation, lymphangitis and their consequences. The conditions favourable to the production of these last-named diseases are far more numerous and common than is the case with diphtheritic inflammation of a wound, but yet if all surgeons would but recognise the comparative facility with which hospital gangrene may be eradicated, we should very soon only hear of this disease as a tradition handed down from the former dark ages of superstition.

Pyæmia.

With regard to pyæmia, I adopt the nomenclature proposed by Hueter, and designate as pyæmic, those cases where there is general severe purulent infection, although no rigid line can be traced between pyæmia on the one hand, and hectic and secondary fever on the other. It does not seem proper to consider all cases

of severe secondary fever as pyæmic. With Hueter, also, I distinguish between pyæmia simplex where there are no metastases, and pyæmia multiplex, where metastatic purulent deposits occur, and where numerous areas of infection are kept up and increased. Nor in tabulating my cases have I made a special class for septo-pyæmia, although I do not deny that this combination may exist; on the contrary, I think that the latter has a distinctive symptomatology, but it must be admitted that it would be arbitrary to decide, from the notes of cases, whether the secretions of the wounds were ichorous or purulent, or a combination of the two.[1]

With regard to the pathological and anatomical aspect of pyæmia, erysipelas, and diphtheria, I feel that I can now add but little to what I have already written in the 'Archiv für Klin. Chirurg.,' Bd. ix. I may observe, however, that in Vienna, metastatic disease of the brain and brain membranes were of remarkably frequent occurrence, especially after operations about the head, the tongue, or the lower jaw. In some cases we were able distinctly to demonstrate that the diphtheritic process extended up the nerve sheaths. Venous thrombosis became more and more rare, whilst pure septicæmia and pyæmia simplex gradually came more and more into the foreground.

Tables of cases of septo-pyæmia (including some of diphtheritic inflammation of wounds) and erysipelas will be found in the 'Wiener Bericht,' 1871-6, p. 54 *et seq.*

[1] The above sentence may serve to explain the significance attached in Germany to the term "jauche" (ichor). There appears to be no true English equivalent; the word "ichor" is used rather vaguely in surgical literature. It would be desirable to adopt some such definition of the two terms—ichor and pus—as suggested by Sir J. Paget in his 'Lectures on Surg. Path.,' 3rd edition, p. 316. "A constant difference between pus and ichor will be, that the latter contains disintegrated or dissolved material of the ulcerating tissue—the former does not."—[Ed.]

CHAPTER IV.

TRAUMATIC ERYSIPELAS.[1]

During the whole course of a tolerably long hospital experience, I never met with so little erysipelas as in Vienna, during the year 1868 (1·1 per cent. of the cases admitted), while in the years 1869-70, the number rose to 6 per cent. There was no great difference between the annual number of the patients under treatment, so there remains this remarkable fact, that the number of erysipelas cases was six times greater in one year than it had been in the previous twelve months, and this without the deterioration of any of the sanitary conditions of the hospital; nay, the rise coincided with the most extensive use of carbolic acid, and the systematic isolation of cases in separate wards.

Such an experience is discouraging, but it would be wrong in the highest degree to infer that we need despair of banishing this formidable foe from our surgical wards. We must study all the more incessantly to learn the nature and method of its action, and must hunt it out from every possible hiding-place.

We know that true (wandering) erysipelas sometimes starts from quite recent wounds, sometimes from those which have existed for a long time; I have tried to distinguish between these two kinds by designating the former "septic" erysipelas, and the latter erysipelas "originating from infection from without." My idea is, that in the former class of cases, the cause of the erysipelas must be attributed to the decomposition of retained blood or secretion from the wound; whereas, in the second class, the infection comes from without. This view as to the double nature of the etiology of erysipelas appears to me to be adopted by most surgeons, though with numerous modifications. It corresponds also with the opinions

[1] In connexion with this Chapter, Prof. Billroth's remarks on the subject in his 'Surg. Path.' (Hackley's Transl.) may be studied with advantage. His views are there clearly and briefly expressed. See also the author's writings in the 'Arch. für Kl. Chirurg.,' Bd. iv and Bd. ix.—(Ed.)

which generally obtain on the method of spreading of other infectious diseases, such as typhus, scarlatina, diphtheritis, &c. There is a tendency among the younger generation to defend more and more energetically the view that these morbid processes solely spread by infection from without. In the case of many other diseases which we now hold only to spread by contagion, there has been a similar alteration of opinion; not so very long since, it was thought that syphilis sometimes was caused by want of cleanliness, sometimes by contagion. The spontaneous origin of measles, scarlet fever, and smallpox is still believed in by many, while absolutely denied by others. Griesinger, who has won such undying fame by his doctrine on the specific nature of the poison of typhus, could account for well known matters of fact, in no other way than by supposing that true typhus might also originate through the absorption of septic matter. Liebermeister denied this, and we now acknowledge that typhus can only spread by specific infection. It was just the same formerly with regard to Asiatic cholera, which was thought to be at times produced in summer by the eating of unripe fruit.

I mention these facts, in order to remind my readers that our views on erysipelas are very much the same as those which obtain among physicians generally, with regard to the majority of infectious diseases; and amongst surgeons, as also amongst the physicians, the number of those constantly increases, who hold that these maladies in the vast majority of cases—perhaps always—are spread by some specific cause of disease.

Long and careful study of these questions has led me to the conclusion that the severe general diseases, which we call septicæmia and pyæmia, are not specific according to our modern interpretation of the terms infection and contagion. With erysipelas and hospital gangrene, the reverse is certainly the case. I was only gradually convinced of the truth of this view; the proofs seem to me simple enough, and I have given them at length elsewhere. Virtually it comes to this:—That the origin of septicæmia and pyæmia depends on the situation and nature of the lesion, and is closely connected with certain definite stages of its progress, while any wound, in any part of the body and at any stage whatsoever, may be attacked by erysipelas, or hospital gangrene.

Supposing that for some twelve months, without known cause, all the erysipelas that occurred was found to attack healthily granu-

lating wounds in all kinds of different stages; or old sinuses of various kinds. If such had been our observation, the opinion that the infection was from without, would gain more and more point; we should naturally tend more to the supposition that there was but one etiological cause for erysipelas, for such a view would be more simple and satisfactory. Where the erysipelas attacked a wound beneath which decomposing blood and secretion had been pent up, we should not be able to ascribe the causation of the disease to these retained fluids. We should be forced to conclude that in such cases the specific poison of erysipelas had been introduced into the wound by the instruments or sponges, or inoculated by the hands of the surgeon himself. Such a hypothesis may be accepted even by those who hold, in all other respects, that the rule is for erysipelas to spread by contagion and infection. We may add that it is an exceedingly rare thing for true erysipelas to arise from the retention of decomposed blood and secretion; usually under such conditions phlegmonous dermatitis is set up. If by true erysipelas we mean lymphangitis, something still further may be added; the phlogogenous[1] poison can be pressed further and further in all directions where the tension of the tissues and fascia offers no resistance, but it would not easily find its way into the lymph vessels (as is shown by artificial injection into the subcutaneous cellular tissue), for the cellular tissue has no lymph capillaries. If the poisonous material finds its way into the branches of the subcutaneous lymphatics, it must flow on in a centripetal direction, for the valves will prevent any back flow into the lymphatic network of the cutis. Lymphangitis can therefore very well be associated with phlegmonous inflammation, but erysipelas not so readily. If, on the other hand, the inflammation of the cutis is the primary affection, the phlogogenous poison will very readily flow off through the lymphatic vessels, explaining the frequent association of subcutaneous lymphangitis with erysipelas. From the lymphatics it penetrates into the cellular tissue, and thus becomes combined with phlegmonous inflammation. This appears to be the most common process of extension. If the excessive swelling of the subcutaneous cellular tissue compresses the branches of the lymphatics and veins, and obstructs the flow, the irritating material spreads in the superficial vascular network along the surface of the

[1] See Billroth's 'Surg. Path.,' op. jam. cit., pp. 89, 90, for explanation of this term.

cutis. Fluids external to the lymph capillaries may diffuse themselves through the meshes of the connective tissue of the cutis —the common form of acute dermatitis. This is proved also by the results of attempts to inject the lymphatic vessels of the cutis. Let us follow out this train of thought a little further.

If we look upon erysipelas as lymphangitis of the cutis, and distinguish it thus anatomically from ordinary acute dermatitis, the question arises, in what degree are we justified in saying that the cause of erysipelas is a "specific" one? Is it really necessary, according to the views above stated, to assume that there is something special and peculiar? If we imagine a phlogogenous substance, which is either soluble in the fluids of the body or else suspended in the form of fine molecules, we are met by a further inquiry; may not this same substance, since it can penetrate into the lymphatic vessels and the meshes of the cutis, into the loose subcutaneous cellular tissue, into the fine subcutaneous lymphatics, or into the veins, set up erysipelas, dermatitis, phlegmon, lymphangitis or phlebitis? May it not therefore depend merely on accidental circumstances whether one form or another of inflammation is developed? I cannot unconditionally answer all these knotty questions in the negative; that is to say, I admit that there is no evidence against the supposition that all these forms of inflammation are capable of being set up by this same irritating, phlogogenous material. But I shall at once be told "there is, then, nothing that speaks in favour of there being a specific erysipelas poison." I answer as follows:—The theory that erysipelas is set up by some material which diffuses itself through the superficial lymphatic networks of the cutis, presupposes several conditions.

(1.) That this material gets into these lymphatic vessels.

(2.) That in these vessels it either keeps or receives its irritating properties; in no case can it well part with them.

(3.) That the passage of the lymph along the surface meets with no obstacles, such, for instance, as would be offered by coagulation.

(4.) That it is not carried off too rapidly,

If it be admitted that a substance possesses these definite properties, and can only act under these definite conditions, we may call it "specific." Nothing at all is alleged against the assertion that there may be many such specific agents.

Possibly, also, the same agents may produce ordinary dermatitis, phlegmon, lymphangitis, or phlebitis, but unless altered, the material which sets up these forms of inflammation cannot also cause erysipelas, not even if it penetrates into the lymph capillaries, for, as stated above, the mere getting in is not of itself sufficient to set up the disease.

The "specific" properties of whatever it is that causes the disease must in this, as in many other cases, be of a purely physical and chemical nature. To my mind this does not interfere in any degree with the view that these phlogogenous bodies may be germs of a vegetable or animal nature; nay, rather, if we assume that the toxic material possesses infective power so prodigious as to exceed a millionfold the most potent inorganic poison, we are reduced to conclude that this poison spreads by some process akin to fermentation. To some such view we are every day more and more impelled.

The phlogogenous substance which, from somewhere or another, without any fresh injury, finds its way into the granulation tissue, thence into the lymphatic network of the cutis, therein diffuses and occasions constantly spreading inflammation, sets up, according to my view, erysipelas. Its "specific" properties just depend upon the nature of its activity. That it does not penetrate into the deeper parts, and so set up lymphangitis, phlegmon, or phlebitis, may be explained by several hypotheses; perhaps it cannot penetrate, or if it does, it may part with its phlogogenous properties during its passage from the superficial to the deep parts. These negative characteristics constitute, in part, the specific attributes of the poison.

No doubt many surgeons will be little satisfied with this definition of the term "specific." All I mean is that such an explanation is possible, and does not run counter to facts; I freely admit my inability to prove that it must be so. There are those who stand rigidly by the orthodox doctrine, that there is one miasma for phlebitis, another for pyæmia, a third for erysipelas, a fourth for lymphangitis, etc., and that they must be inhaled or swallowed like other miasmata, all of which have certain common properties. Once introduced into the system, each, according to its own separate nature, selects a particular tissue or organ in which it carries on its mysterious work. (The so-called "specific" drugs are undoubtedly analogous in this respect.) To the disciples of this

theory it must be answered, that, when we take into account the results of careful observations, their views as regards accidental diseases of wounds can no longer be sustained.

For reasons already given, it will be admitted that the cause or causes of erysipelas are always brought from without into the organism; they may be introduced during operations, by dressings, or by the air of the ward.

I by no means conceal the fact that a view such as this of the etiology of erysipelas would to me be very acceptable; but observations have, to my mind, unquestionably shown that, under certain rare conditions, the poison of erysipelas, with all its "specific" characteristics, as above explained, may develop in the body itself from substances which have no relation with the atmosphere or external influences. Thus it comes about that true erysipelas will develop in the skin over a joint affected with metastatic inflammation. I noticed such an occurrence no long time since in a man who was attacked with pyæmic inflammation of the elbow-joint after external urethrotomy. I satisfied myself, by the most careful examination, that there was not the slightest excoriation of the skin from which erysipelas could have originated. I can only explain the occurrence of this undoubted erysipelas on the supposition that the products of inflammation penetrated, in some exceptional way, through the lymphatic vessels from the synovial membrane to the cutis (that is to say, the current in the lymphatics was reversed), and thus set up the capillary lymphangitis. Closely related to, in fact, at times hardly to be distinguished from, true erysipelas, is the reddening of the skin over the joints in gout. Again, there is a form of dermatitis very similar to erysipelas which occasionally accompanies diphtheritic inflammation of the bladder or mucous membranes, and hospital gangrene; but in all these cases one prominent characteristic of traumatic erysipelas is wanting, viz. its power of spreading and wandering over the surface.

In connection with pyæmic exudations, and in diphtheritis, arthritis, &c., phlogogenous material may be generated and pass into the lymph capillaries of the cutis, but it will not acquire the property of diffusing the process widely over the cutaneous surface. These are abortive varieties, as it were, when compared with the forms of erysipelas set up by infection. They possess a few, but not all, of the properties necessary to set up real erysipelas; they are not thoroughly "specific," but, so to speak, only half caste.

It is difficult in the face of what has been said to hold by the etiological unity of erysipelas; for the present we must admit that it has a twofold mode of origin. It may commence by the transmission of some substance coming from without, ready to set up, and fully capable of itself of setting up, the disease, or by the development of a similar material in connection with certain morbid products. In this respect I hold the same views with regard to the origin of erysipelas as I do to that of diphtheritic inflammations.[1] It is decidedly far more common for the latter to spread by contagion, but, under the influence of septic blood poisoning, they may originate independently of contagion.

We must confess our position, and acknowledge that our information on the etiology of disease increases very gradually, but it would be wrong did we fail to recognise how much has been achieved by careful work during the course of the last ten years,[2] or did we ignore how these questions, as time goes on, are assuming more precise and definite shapes.

Statistics showed that the period of the year had no influence on the origin and extension of erysipelas in our hospitals. The disease lasted usually but a very short time, owing probably to the early isolation of the patients. The percentage of women attacked was twice as great as that of the male patients. This fact, however, I do not ascribe to the greater receptivity of the female sex to erysipelas, but rather to the arrangements of my wards in the hospital at Zürich; there, the female wards, and the separation room to which the erysipelas patients were transferred, were all on the ground floor. It is quite possible—notwithstanding that the utmost precautions were taken against such an occurrence—that the contagion was carried on the clothes of the assistants or nurses from one room to the other. Moreover, the walls of ground floor rooms are more inclined to be damp; not that this of itself can produce erysipelas, but if the contagion is in the form of minute, dust-like particles—whether of animal or vegetable nature—it would more readily get attached where the walls are damp.

In certain patients, erysipelas occurred immediately after operation. If the infection were set up at the time of operation, such cases show that erysipelas has no stage of incubation, but that the

[1] 'Wien. Med. Woch.,' 1870, Nos. 7 and 8.

[2] This essay on erysipelas is contained in the 'Wien. Ber.' for 1869—70, published in Berlin, 1872.—[Ed.]

disease begins as soon as the patients are exposed to the infection. In a few cases the onset of erysipelas followed so directly on some slight surgical proceeding—such, for instance, as the probing of a wound—that the probability of infection from the instrument could not be ignored. One of the worst cases of erysipelas I met with, and which ended fatally, developed in a young woman, immediately after the cauterisation of an old sinus of the breast with the galvanic wire. Even supposing that the sinus was infected by the probe which was used to introduce the wire, it is most remarkable that the contagium was not immediately destroyed by the intense heat. There is a terrible mystery about such cases.

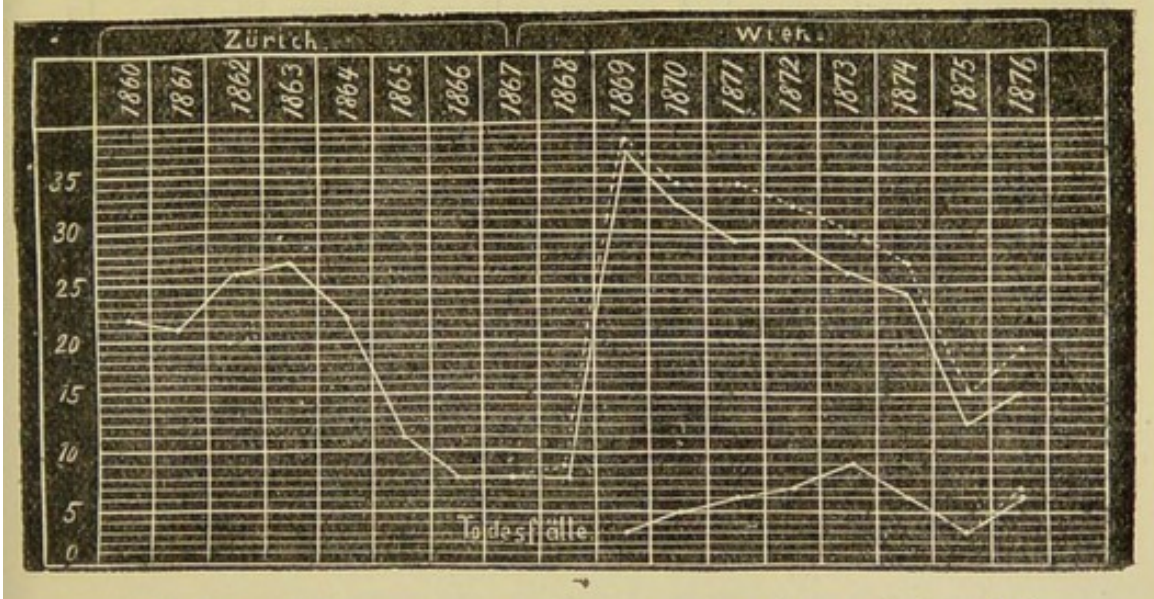
I was unable to prove that age, occupation, or the constitution of the patients had anything to do with the causation of erysipelas. As to the duration and course of the fever, I have very little new information to give, but I have frequently been able to confirm observations previously made, that many cases are attended by continuous fever, while others run their course with interrupted attacks, each lasting several days (erysipelas recurrens).

The only prophylactic treatment that is of any avail against the spreading of erysipelas in hospitals, consists in thoroughly cleaning and disinfecting the wards in which a case of erysipelas has broken out, whether it were introduced or whether it originated in the wards. The entire wards, and all the beds, bedding, and furniture must be most carefully disinfected. Isolation when the patient is once attacked is but a poor substitute when one cannot employ these radical measures. Erysipelas diminished to a minimum in my wards at Zürich, from the time that extra rooms were placed at my disposal, and I was able every five weeks to completely empty and thoroughly cleanse the wards. It has been urged against the efficacy of such precautions, that cases are recorded where the very first surgical patients admitted into newly-built hospitals were attacked with erysipelas. Is it not possible in these cases that old sources of infection were introduced into the new house, in the bedding, bandages, etc.? Again, were the surgeons and nurses changed? The "specific" contagium of erysipelas, once started, is exceedingly difficult to destroy, and exceedingly difficult to banish from the wards. Still, if our nurses would give as much trouble to hunting out and clearing away every particle of dust from the wards as a careful housewife does to keep her house in

proper order, we should gradually see erysipelas disappear from our hospitals.

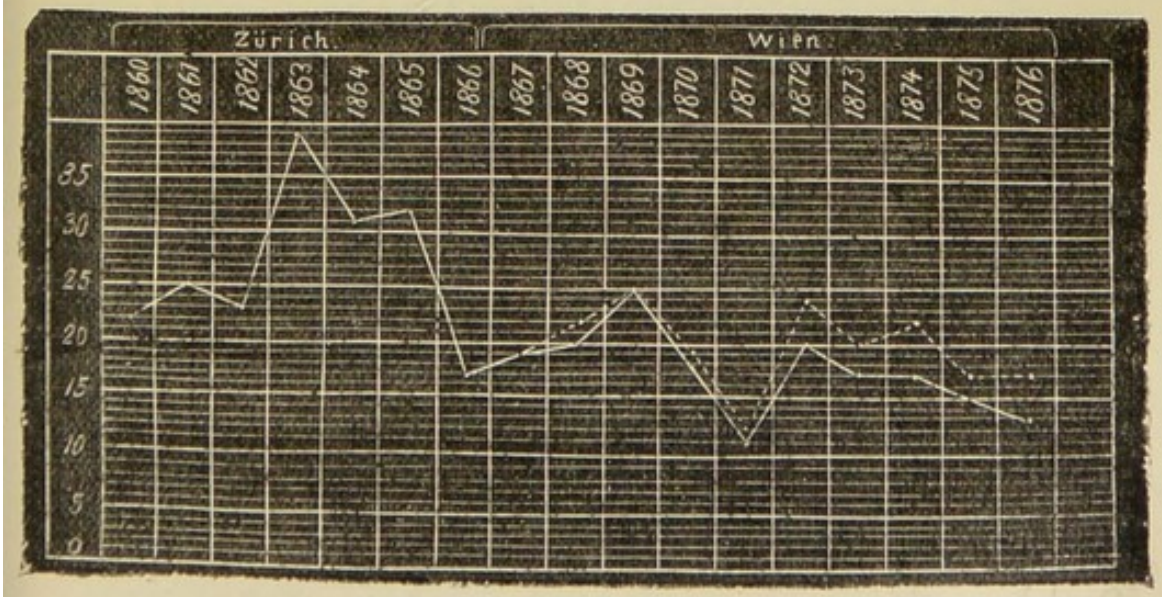
The chart (Fig. 1) illustrates in a remarkable manner, the number

FIG. 1.—ERYSIPELAS.



The dotted line . . . . . shows the number of cases in hospital and private practice together. The lowermost line marks the number of fatal cases.

FIG. 2.—FATAL SEPTO-PYÆMIA.



of cases of erysipelas met with between 1860-76. The dotted line includes cases occurring in my private practice. With regard to

this chart, I think that the fall observed between 1863-66 may be ascribed to the open treatment of wounds. The remarkable rise in 1869 was principally due to an improper sanitary condition of the female wards.

If the erysipelas chart be compared with that showing the number of cases of septo-pyæmia (Fig. 2) it will be observed that there is no great amount of correspondence between the two. In 1863, it will be noticed that the line begins to fall; now, this period again corresponds to the date when I first employed the open treatment of wounds. I did not adopt the antiseptic method till 1875. On the whole, the tables suggest that the mere treatment of wounds has not such an all-powerful influence as we are disposed to ascribe to it, but that other agencies are concerned—agencies which we do not know, though we can guess what their nature is.

CHAPTER V.

HEAD INJURIES.

SECTION A.—*Scalp wounds without brain symptoms—Case. Injury to skull without brain symptoms—Cases. Fatal case of punctured wound. Case of concussion with pulpy discharge from the ear. Cases of severe concussion. Cases—Depressed fracture of the skull, fractured base, encephalitis. Two cases of head injury with late cerebral symptoms. Case of trephining. Case of cerebral abscess without fractured skull. General remarks on head injuries.*

THE following cases are separated according to the custom which usually obtains in surgical text-books, into injuries of—(1) the soft parts; (2) the bones; (3) scalp; and (4) brain. For practical purposes this seems the best arrangement.

Cases of scalp wound without any brain symptoms.—An injury of this nature occurred in a man who came into the hospital with symptoms of septic poisoning. *Post mortem.*—Neither meningitis, thrombosis of the sinuses, nor metastatic abscesses were found. The other two were children of five and eleven years old respectively, in whom the scalp was extensively torn. In both, suppurative meningitis with thrombosis of the sinuses was discovered after death; the younger child died on the twenty-eighth, the elder on the twenty-fifth, day after the injury. In the latter case a few days before death the right cornea sloughed, owing to compression of the ophthalmic division of the fifth nerve by pus in the cavernous sinuses.[1]

My constant practice is to sew up scalp wounds when they gape widely, but I remove the sutures if any considerable swelling and pain appears in the neighbourhood of the wound. If this be not promptly done, I generally found much pain, tension, and sharp fever result.

[1] This case is fully reported in the 'Wien. Wochens.,' 1867.

Four cases of bone injury of some importance, but without any brain symptoms, did well.

Case.—W. H—, æt. 23, a strong miner, was injured in blasting a rock. He came up to the hospital at once with a lacerated wound, two inches long, over the left frontal eminence. Fifteen small fragments of bone were extracted, leaving a gap in the skull the size of a shilling. Dura mater uninjured; uninterrupted recovery in forty-three days.

Case.—D. S—, a labourer, æt. 50, was injured in the same way as the preceding case. Here, however, a fragment of stone, the size of a sixpence, was firmly embedded in the bone in the middle of the forehead. Several medical men had attempted to extract it without success, and the patient was sent up to the hospital twelve hours after the injury to be trephined. By gouging away a portion of the external table near the impacted body I was able to remove it with the elevator. A few small fragments were taken away with the forceps. The dura mater was uninjured. Recovery in twenty-five days.

Case.—R. F—, a smith, æt. 30, was injured by a heavy blow on the forehead from a stone. Six weeks after the injury the wound was still suppurating; some small fragments of the stone were then extracted, but the wound did not completely close, and the patient came up to the hospital, eight weeks after the injury. A sinus in the middle of the scar, close to the hairy scalp, led down to exposed bone. I slit up the sinus, and removed a number of fragments of bone and of the stone. The gap left extended through the whole thickness of the frontal bone, and the dura mater was seen, but not pulsating. The wound healed in fifteen days after the slitting up of the sinus.

Case.—J. M—, æt. 22, an artisan, attempted to commit suicide. He placed the barrel of a pistol, loaded with two bullets, against the middle of his forehead and fired it off. Blood flowed from a wound, but he did not lose consciousness, and made a second unsuccessful attempt, this time placing the muzzle against his right temple. After this he desisted, and went to a doctor, who removed a piece of lead from the wound in the temporal region, and sent him up to the hospital. We found two lacerated wounds, their edges blackened with powder, in the situations mentioned. No injury of the skull could be made out, although the bone was exposed in the neighbourhood of the wounds. Superficial necrosis followed and he recovered in seventy-eight days.

The absence of even transitory concussion in this case is to be explained by the fact that the injury was confined to a small portion of the skull. In military practice similar cases have been met with, though not often; the favourable progress of the first three cases is accounted for by the circumstance that the dura mater was uninjured.

In one case we had to deal with a punctured wound in the right temporal region, the result of a stab with a penknife. At first there were no brain symptoms, and the injury was considered trivial. On the fourth day considerable headache came on, followed shortly by great restlessness, delirium, and finally coma. Death on the sixth day after the injury. Post mortem: a small punctured wound was found passing through the temporal bone into the brain; in the anterior lobe the brain substance was broken down at one part into a soft, red, pulpy mass, the size of a walnut.

The condition found agreed with the diagnosis; attempts had been made to find the opening in the bone during life, with the object of letting out the pus. The opening, however, was not discovered, inasmuch as the wound ran very obliquely through the temporal muscle. Even if the opening had been enlarged no good would have come of it, as no pus had formed that could have been evacuated.

Concussion, with symptoms varying from those of a transitory nature up to twenty-four hours' duration, without any further brain symptoms following.

Vomiting was but seldom observed.

In one of these cases, where there was no scalp wound, erysipelas occurred, commencing at the right ear, from which bleeding had taken place.

Bleeding from the nose and ear, and ecchymosis of the ocular conjunctiva is not uncommon. In many of these cases there might have been fissures of the skull which could not be diagnosed.

In one patient there was a discharge from the ear, of a pulpy white nature, mixed with blood, which had exactly the appearance of brain matter. Still, the case could hardly have been mistaken for fissure of the base, with discharge of brain matter, in the face of complete recovery, even had not microscopical examination proved that the discharged pulp consisted of epithelial elements coming from the external auditory canal. The tympanic membrane was uninjured.

Concussion, with more or less persistent disturbance of the mental faculties.

A young student fell, in the dark, from a terrace unguarded by railings. He lay unconscious, and was brought up to the hospital soon after the accident, with symptoms of severe concussion; no mark of injury could be discovered about the head. The unconsciousness continued, and a few days after he became very restless. He would try to avoid examination by curling himself

up in a corner of the bed, and rolling his blanket round him. This condition lasted five days. He then began to answer questions, but unintelligibly. For three weeks he was off his head. He ate, drank, and slept, but answered irrationally, did not know where he was, or recognise his relations. He was during this period free from fever, clean, and easily managed. Gradually his intelligence began to return. Five weeks after the injury his intellectual faculties were completely restored. The treatment consisted in frequent douching.

Since this I have observed a similar case of less severity, where the intellectual derangement lasted only eight days after the concussion.

A woman, æt. 22, was beaten about the head with an axe. Unconsciousness for four hours. Vomited twice. At the back of the head were several wounds down to the bone; at the bottom of one the bone was exposed to the extent of a florin and depressed to the depth of six to nine lines for an extent of one inch. Ecchymosis of both eyelids, subconjunctival in the right eye. Pupils equal, much dilated, sensitive. Treatment consisted of ice and aperients. For the first week after the injury there was severe headache. The depressed portion was left as it was. Traumatic fever, lasting twenty-four hours; then secondary febrile disturbance on the ninth day, lasting five days. No direct cause to be assigned for this latter attack which was followed by rapid convalescence.

Depression of the skull with loss of consciousness quickly passing off. Death from encephalitis.

C. W—, æt. 18, a labourer, was struck on the head, just to the left of the sagittal suture, by a brick; insensible for ten minutes; vomited four times before admission; a V-shaped clean cut wound 6 cm. long, at the middle of which was a depression from 6 to 8 mm. deep; no gaping of the bone; no paralysis; conscious, memory clear. On the morning of the second day he passed his urine under him. In the afternoon of the same day right motor paralysis; sensation partial. At times only the patient could be got to answer questions slowly. Calomel was given, ice applied, and venæsection performed. On the third day complete right anæsthesia, with total loss of consciousness. The depressed fragment was elevated, and a small wound of the dura mater seen. The operation was unsuccessful. Deep coma, and death four days after the injury. Post-mortem: a fissure an inch and a half in length was discovered, which commenced at the back part of the left side of the frontal bone and ran over the left parietal towards the medial line. At the posterior extremity of this a second fissure three quarters of an inch long was seen in the left parietal bone. Immediately in front of the coronal suture a third, half an inch in length, extending through the thickness of the

left half of the frontal bone. On the border of this last fissure a fragment of bone about the size of a hazel nut was driven in to a depth of a line and a half. This depressed portion formed an irregular boundary to a gap the size of a sixpence, limited on the other side by the teeth of the sagittal edge of the right parietal.

The dura mater corresponding to the extent of injury to the bone, and the whole convex surface of the large hemisphere was of a dark green colour, infiltrated with purulent fluid, and perforated in two places, each the diameter of a pea; these rents extended through the pia mater and were close to the longitudinal sinus, which contained fluid blood. A reddish, pulpy area, the size of a walnut, was found in the cortex of the brain, the capillary blood-vessels in the neighbourhood of this area being much injected. The rest of the brain was anæmic, and moderately firm. A few drachms of clear serum in the ventricles.

Fractured base. Insensibility from the time of injury up till death.

F. S—, æt. 44, fell from a scaffold, a distance of about six feet. When admitted he was in a heavy, drowsy condition, but moved the arms and legs about in a restless manner, and had strong convulsive movements of the whole body. Death took place forty-eight hours after the injury. Post mortem: Extensive fracture of the right and left orbital plates, extending through the sella turcica as far as the clivus. A triangular portion of the frontal bone corresponding to the glabella lay loose in the cavity of the skull. The dura mater was somewhat stretched, the pia mater infiltrated with puriform fluid, particularly at the base of the anterior and middle lobes. Pulpy breaking down of the brain cortex over the extent of a sixpence at the anterior extremity of the right anterior lobe of the cerebrum.

Severe brain symptoms after an injury to the head and scalp wound. Pyæmia thirty-three days after the injury. Thrombosis of the sinuses.

J. M—, æt. 33, fell down some steps on to the back of his head, and sustained a slight wound in the occipital region, which was not thought of much importance; no cerebral symptoms. A few days later, suppuration began beneath the scalp, and several incisions were made; the local symptoms improved, but some giddiness remained; the face was flushed and the pulse small; leeches were on several occasions applied to the back of the neck, and ice-bags were kept continually on the head; he had no paralysis, but became more and more emaciated. The original wound and the incisions healed up. Thirty-three days after the injury he had a rigor, which was repeated during the next few days. Death occurred forty-one days after the injury. Post mortem: a fissure three inches long was found, extending forwards from the foramen magnum. Pus in the subcutaneous veins of the

scalp and in the right transverse sinus; the other sinuses were free from thrombus. At the apex of the left anterior lobe of the brain, a cavity the size of a walnut, filled with rust-coloured pulpy matter; on the under surface of the right hemisphere of the cerebellum, a superficial softened patch the size of a shilling. Some softening on the lower surface of the right posterior cerebral lobe.

In none of the cases which came under my care in the Zürich Hospital was there discharge of cerebro-spinal fluid from the nose or ears, or hernia cerebri.

Three cases of head injury with late cerebral symptoms.

K. R—, æt. 32, was so beaten about the head with a hatchet and a knife, that the scalp was regularly cut to pieces. In many places the periosteum was torn from the bone. No cerebral symptoms after the slight temporary loss of consciousness had passed of. Profuse suppuration followed, but, with the exception of a spot the size of a florin where the left parietal bone was exposed, the scalp united over the skull. The patient had severe fever for sixteen days; the temperature being seldom below 39°. From the sixteenth to the twenty-fifth day some secondary fever. Convalescence was unsatisfactory though no special symptoms could be noticed. The patient continued in an apathetic state. On the twenty-fifth day she became again very feverish with severe headache. This was followed a few days later by partial loss of consciousness, so that she would hardly respond to questions. The fæces and urine passed involuntarily. As the exposed bone was seen at one spot to be infiltrated with pus, I suspected the presence of pus beneath. I therefore removed some bone with the chisel, but finding only fluid blood in the deeper part of the skull, I abstained from opening the cranial cavity. Death took place on the thirty-fifth day after the injury. No symptoms of paralysis throughout. Post mortem: a portion of the upper part of the frontal bone the size of a florin, dull white, partly necrosed. The dura mater on the upper part of the left hemisphere studded with greyish-red granulations, the size of hemp-seeds. The brain—especially the anterior half of the left hemisphere—swollen and fluctuating; in this hemisphere an abscess, containing several ounces of very foul pus, which had opened into the left ventricle; the abscess cavity surrounded by a layer of greenish-coloured granulations half a line in thickness.

If I had adopted bolder measures in this case, and trephined through the bone, I must have come down on the abscess, the existence of which I suspected. It is doubtful, however, considering the large collection of pus, whether such a proceeding would have saved the patient's life.

M. D—, æt. 71, fell down stairs while drunk. A large flap of the scalp

over the left parietal bone was torn up, together with the periosteum, so that the bone was exposed over an extent the size of the palm of the hand. Considering his advanced age, the patient went on better at first than might have been expected. Two months after the injury a fragment of bone, an inch square, was removed, which included the whole thickness of the skull. The brain pulsations were visible after the removal of the sequestrum. Two weeks after this he was attacked with erysipelas of the head and face, and abscesses formed at several spots. He rallied a little from this attack, but was reduced to a very low condition, and died on the 101st day after the injury with symptoms of purulent meningitis. Post mortem: "A number of perforations were found in the parietal bone, some the size of a bean, some of a sixpence; in other parts the outer lamella only was left, rough and of a faint yellow colour. The dura mater thickened, the outer surface of the membrane corresponding to the perforations in the vault, covered with yellow breaking-down granulations. Brain anæmic and wet. In the right iliac vein a thrombus, which had caused some œdema of the lower extremity of the same side."

A. B—, æt. 31, a labourer, fell backwards from a waggon. For half an hour he was insensible, then quickly recovered consciousness. A wound an inch long over the left parietal eminence healed up rapidly, with the exception of a small suppurating opening. The patient was about to return to his work, when—twelve days after the injury—he was seized with violent headache, and, two days later, when brought back to the hospital he was unconscious. All the symptoms pointed to severe meningitis; fluctuation was felt beneath the cicatrix. An incision let out some thin pus, and the bone below was found to be exposed. We diagnosed a contusion of the brain, with meningitis and suppuration beneath the site of injury. He was trephined on the fifteenth day. The moment the cranial cavity was opened a stream of pus gushed out. No improvement or consciousness followed, and he died on the following evening—five days after the onset of the acute secondary meningitis. Post mortem: "Purulent infiltration of the diploë in the neighbourhood of the injury; diffuse purulent meningitis on the left side, with pus in the veins of the dura mater. Convolutions flattened. A large number of abscesses in both lungs."

Abscess of the brain following head injury without fractured skull.

A strong carman, æt. 30, was admitted, having been run over three days previously, with a wound over the right parietal eminence. The patient picked himself up immediately after the injury, went home, and applied cold compresses to the wound. On the third day the wound began to suppurate, and he applied to a doctor, who advised him to go to the hospital. On admission we found a semicircular flap, three inches long, torn up from the skull. The bone was exposed, but no fissure could be seen. Six days after the injury slight right facial paralysis appeared, which soon became complete. This was succeeded by stiffness of the muscles at the back of the neck, the head being constantly bent

over to the right. In the course of the next week the whole body became stiff and hard as a board, so that he could be lifted up as if he were made of wood. He became greatly emaciated. The mind was clear up to his death, which occurred on the twenty-eighth day after the injury. The edges of the wound had become firmly united, and superficial exfoliation of the exposed bone had taken place. Throughout there was absence of fever. Post mortem: Notwithstanding the most diligent search, no fissure of the skull could be found; the dura mater immediately beneath the wound was adherent to the bone, and beneath this an abscess of the brain, one inch in diameter, was found; nothing else abnormal in the brain or other organs.

I conclude that in this case the parietal bone had been driven in without fracture, and that a contusion of the brain led to the formation of abscess.

Head Injuries with severe Brain Symptoms.

These may be classified as follows, according to their progress and symptoms:

1. Cases in which brain symptoms occurred simultaneously with the injury.

Under this head may be noted a case of commotio cerebri which terminated fatally on the fifth day; symptoms of compression appeared on the third. We found diffuse suppurative meningitis without extravasation or fracture of the skull.

Among the patients with symptoms of compression dating from the time of injury, but who survived, the injury was followed in one case by paralysis of the portio dura, in a second of the oculo-motor nerve; a third had complete paralysis of the right arm, while in a fourth persistent deafness of both ears resulted. In two of the fatal cases there was crossed hemiplegia. One patient who had sustained a slight depression of the occipital bone, was nearly completely paralysed in both legs for two months. He then began to improve without any special treatment, and subsequently recovered the complete use of the lower limbs. In one instance, as the result of a small circular fracture of the left parietal bone without injury to the dura mater, weakness and numbness of the left forearm and hand followed. The paresis disappeared completely after eight days and the patient got well.

In two cases of gun-shot wound a revolver bullet passed through

the head from front to back, carrying splinters of bone through the brain; in both, the bullets were afterwards found on the inner surface of the occipital bone, against which they had impinged without perforating. One of these unfortunate suicides survived the injury twenty-four, the other thirty-eight hours. The other cases terminated fatally, for the most part, about the third day. Contusion of the brain substance and suppurative meningitis were almost invariably found; in one case only was death brought about by compression from extravasated blood.

2. Cases in which the brain symptoms first began some time after the injury, that is to say, from twelve to twenty-four hours up to from three to twenty-eight days.

All the cases met with at Zürich which came under this head terminated fatally, the greater number from suppurative meningitis following limited depression. Metastatic abscesses in the lungs were found in one case where the brain symptoms began after a rigor occurring on the twelfth day. In another case brain symptoms showed first on the twenty-eighth day. Here there was a depression at the back of the head with the fragments firmly wedged in (the injury had been caused by a falling brick), and some portions of the internal table were necrosed; this latter was doubtless the cause of the extensive suppurative meningitis which was set up so late.

General Remarks.

It is easy enough, in cases of head injury, where the sensorium is unaffected and the general condition normal, to note the commencement of congestion or inflammation of the brain. In cases, however, of compression or of severe commotio cerebri (which conditions are often not easily to be separated, and which are very frequently combined), dating from the reception of the injury, the onset of meningitis is often very difficult to determine; in such cases inflammatory symptoms are mostly wanting, and the patient not uncommonly passes directly from a semi-conscious, or highly restless condition, into a state of profound coma. Under such circumstances, the rigors, which not infrequently clearly indicate the onset of meningitis, are wanting. According to my experience, dilatation of the pupils and slowing of the pulse first appear, when

the patient lies in a condition of heavy drowsiness, and when there is but little hope of recovery. High temperatures, together with complete loss of consciousness and slow pulse, may sometimes indicate meningitis. When a head injury is followed by increasing symptoms of compression, but without fever, and death takes place after two or three days, probably no meningitis will be found post mortem. In such cases death must be ascribed to compression caused by extravasation and serous effusions.

Do the cases of acute suppurative meningitis really only die from compression and œdema of the brain, the result of the pressure exercised on the return flow of the venous blood? This question I have often put to myself at the autopsies of these cases, particularly when the purulent and serous effusions were small in amount, and totally out of proportion to the severe symptoms observed during life. For my own part, I am convinced that blood-poisoning, which is nearly always associated with traumatic meningitis and manifests itself by high fever, is perhaps quite as often the cause of death as the compression of the brain. I have no doubt in my own mind that "foudroyante" traumatic peritonitis, and acute traumatic pleurisy,[1] are fatal from the extensive absorption of highly poisonous inflammatory products; this is easily explained on anatomical grounds, for we know through v. Recklinghausen that these serous membranes are immensely rich in lymphatics, and that these same lymphatics have openings on their free surface, into which molecular bodies can pass. The researches of this observer have shown further that the membranes of the brain and the brain itself are both richly supplied with lymph channels (perivascular canals). Now, by these—so soon as traumatic inflammation is set up—the highly poisonous products can be readily taken up, so that anatomical grounds exist for the assertion I have just made. Septicæmia, as we observe it come on in injuries of the extremities, without any head lesion, is often marked in its course by partial loss of consciousness or maniacal delirium, and evidenced by the hot, flushed forehead, a full, hard pulse, in short, by symptoms which in a case of head injury we should refer positively to the participation of the brain, while really such brain symptoms are only the result of blood-poisoning. It is exceedingly difficult to assign in every case the right cause, from symptoms such

[1] *i.e.* Secondary, pyæmic pleurisy. Ed.

as these. I have met with cases where I was very doubtful whether I had to deal with delirium arising from drink, or from septicæmia.

In all the cases of severe injuries of the skull which I examined post mortem at Zürich, I found only coagulated blood diffused over the dura mater; where there was deep circumscribed depression, the dura mater was invariably torn. In most of the cases of fissure and fracture of the skull, contusion of the brain substance existed at the same time, so that I never regretted that I did not trephine. With regard to the removal of splinters of bone, the same rules are to be followed as in compound fractures generally.

Ecchymosis of the eyelids and bleeding from the ear and nose, combined with a drowsy, heavy condition, are the surest signs of fractured base that I know. Contusion of the brain is so frequently associated with depressed fracture of the skull that the diagnosis of the one condition mostly coincides with that of the other. We are only justified in diagnosing fracture of the petrous bone from paralysis of the facial nerve, when deafness of the affected side is present at the same time. Paralysis of the portio dura, as I have observed, may be manifested when the upper or lower part of the hemispheres is contused.

I employ ice-bladders to the head in all severe cases of injury to that part. Venæsection I find of service only at the commencement of meningitis. In the later stages of meningitis and encephalitis it appears to me to be injurious and to expedite collapse, as it does also in septicæmia. The same applies to the exhibition of aperients.

Of fifty-nine cases of severe head injury met with in Vienna, in which brain symptoms began at the time of the injury and continued up to death, or lasted for days and weeks after general recovery, twenty-three were discharged from hospital. But some paresis, as I have said, remained in many of these. In one of these cases epileptiform convulsions came on four years after the injuries, without any intermediate illness, and proved rapidly fatal. Post mortem: superficial softening of the base of the brain was discovered, corresponding to the spot where the original extravasation must have been. Looking at this case, I much regret that I am unable to give any particulars of the subsequent history of the others who recovered; I greatly fear that the same thing has taken place in other cases also. At present nothing can be positively stated as to how long this sword of Damocles—viz. disease of the brain

occurring long after an injury to the head—hangs over those in whom there has been extensive extravasation and loss of consciousness for a considerable period, followed by slow absorption of the effused blood.

Section B.—Chronic Inflammations and Tumours.

Cases of:—Chronic ostitis. Syphilitic necrosis. Warty hypertrophy of scalp. Congenital cyst. Periosteal fibro-sarcoma. Melanotic sarcoma. Osteo-sarcoma. Epithelioma.

Periostitis of the skull and caries, possibly of syphilitic origin.

A weakly-developed girl of 18, had periostitis and ostitis with ulceration and necrosis of the frontal bone, together with periostitis of the tuber ischii. She was highly anæmic, marasmic, and the subject of lardaceous disease. Death from acute purulent meningitis. The whole of her family were very subject to bone diseases. Her sister died of caries of the hand and spine. No congenital syphilis could be proved.

Syphilitic necrosis of the skull.

A—, æt. 44. Syphilitic infection twenty-four years previously. Since then his wife had borne three healthy children, one of whom died of typhus when fifteen years old. The others were still alive when he was under my care. The frontal bone had been affected with syphilitic disease for nine months. Almost the entire left half of the bone was removed as a sequestrum. The dura mater beneath was covered with granulations, and the pulsations of the brain were very plain. The patient did not wait for the part to cicatrise over, but left with a shield over the gap. Six years afterward he was in good health, and had had no further syphilitic manifestations.

Warty hypertrophy of the scalp.

The drawing (Pl. I, fig. 1) was taken from a young man, æt. 20, with a warty hypertrophy of the scalp, which had existed from infancy. It was excised with complete success; an elastic

bandage was placed round the head, so that there was scarcely any loss of blood.

The following case of a congenital cyst at the back of the head with serous contents, its cavity unconnected with that of the interior of the skull, is so rare as to be well worthy of record.

R. W—, a female child, 3 days old, was admitted for a congenital tumour at the back of the head. The birth had been accomplished by natural means. The tumour gave the child a two-headed appearance. (The shape and size of the swelling may be gathered from the illustration Fig. 3). The tumour was

FIG. 3.—CONGENITAL SEROUS CYST.

soft, fluctuating, and moderately full of fluid, so that we were able easily to satisfy ourselves that there was no opening in the skull, and that the tumour

was neither an encephalocele nor meningocele. The right ulna was unnaturally short, so that the hand of that side was strongly adducted. No other deformity was noticeable. As soon as the child had become a little accustomed to residence in hospital, and took its food well, I punctured the cyst and drew off five ounces of clear, light-coloured fluid.

Prof. Wislicenus, of Zürich, who examined the fluid, reported its composition to be, briefly as follows:

Serum albumin . . .	4·29 per cent.
Myosin and fibrin-forming ingredients .	Very small quantities.
Paralbumin	A trace.
Mucin	0.
Urea	The slightest trace.
Sugar	Doubtful.
Sulphuric, phosphoric, and muriatic acids, Sodium chloride . .	A little.

This analysis showed that the cyst did not contain cerebro-spinal fluid, which has remarkably little albumin. No opening could be found in the bone after the puncture. The sac began to fill again slowly, but diarrhœa came on the day after operation. This was followed by pneumonia, and the child died, a week after the puncture. Post-mortem: the cyst was found to consist of a thin-walled sac with a very smooth lining. It lay in the cellular tissue beneath the scalp, and was easily removable from the bone. No opening in the skull, or defect where some previously existing communication might have been shut off, could be found.

The following interesting case of periosteal fibro-sarcoma of the back of head, occurred in private practice.

H—, a merchant, æt. 40, of moderately strong build, first noticed, when he was twenty years of age, a hard lump in the occipital region. Its growth was very gradual and painless. The tumour was removed when it had attained the size of a walnut. Ten years after, some thickening appeared about the cicatrix of the operation wound. For a time it remained stationary, then after a few years began again to grow slowly and without pain. It was removed a second time, fifteen years after the first operation. Shortly after the wound had healed some fresh nodules appeared in the cicatrix. These grew rather more rapidly than before, and were not movable on the bone. Eighteen years after the first operation, a growth the size of a florin was removed, and the exposed bone cauterised; superficial exfoliation followed. Two years after this I first saw the patient. The growth had recurred locally, very shortly after the last operation wound had healed. I found all the back of the head, down to the muscles of the neck, covered with hard, painless nodules, varying in size from a bean to a cherry. Some were isolated, some had coalesced. I diagnosed periosteal fibroma with implication of the cervical lymphatic glands. The disease was so extensive that I consented rather reluctantly to operate. On the 6th December, 1861, I removed the whole of the diseased parts, including all the occipital scalp, very freely, and scraped away the periosteum with the raspatory. The patient did remarkably well

after this. The bone surface granulated without exfoliation. In twelve weeks the wound healed, but then a new growth appeared in the neck and soon after in the cicatrix. In the spring of 1862 the recurrent growth was again operated on, this time by caustic arrow-heads. He grew weaker, and finally died of marasmus, after intense suffering. There was a perforation of the skull the size of a florin.

The entire duration of the disease from the commencement was twenty-four years.

Microscopically the tumour was found to be a highly granular fibro-sarcoma.[1]

Melanotic alveolar sarcoma of the head.

S. S—, æt. 53. When 43 years old a tumour developed in the left parietal region after an attack of erysipelas of the head. Three years later the growth was removed, when it had attained the size of a chestnut. The patient was unable to inform us whether it was then at all black. For four years after this there was no recurrence, but then a nodule developed in the cicatrix, which was removed seven years after the first operation. It was then the size of a hen's egg and superficially ulcerated. It proved to be an alveolar melanotic sarcoma.[2] He was seen two years after, and was then in good health, free from any recurrence of the growth.

J. M—, æt. 37. Fifteen years before admission a nodule appeared over the left parietal region, which increased so slowly that after three years it was no larger than a hazel nut; at the least irritation the growth became inflamed, so that her medical attendant mistook it for an abscess and made an incision into the swelling. No pus came, but the opening ulcerated, and the growth increased rapidly, and became adherent to the bone. Owing to an attack of erysipelas, operation was postponed. The patient was lost sight of.

Osteo-sarcoma.

M—, æt. 22, had a tumour the size of an apple behind the left ear, which could not be moved on the bone beneath. Its connection with the temporal bone was sawn through and the growth removed. The tumour consisted, for the most part, of bone as hard as ivory, interspersed with fibro-sarcomatous tissue. She was seen again three years later, and there was then no recurrence.

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[1] *I.e.* a spindle-celled sarcoma where the fibrous intercellular substance preponderates. Cf. Billroth, 'Surg. Path.' Hackley's Trans., 1877, p. 613.

[2] Op. sup. cit., p. 616. The absence of recurrence is remarkable. See a case infra, in Chap. X, Section A.

Epithelioma originating in a cicatrix; removal. Meningitis on the sixth day. Death.

F. O—, æt. 33, a maid-servant, when a year old was severely burnt over the left temporal region. The cicatrix, which was about the size of the palm of the hand, did not heal up completely for two years. No bone came away. Three years and a half before her admission, the cicatrix began to ulcerate without obvious reason, at several isolated spots, and scabs formed. Very soon the ulceration spread over the entire cicatrix, and when the patient was first seen, the whole surface presented the appearance of a superficial epithelioma, which on removal it proved to be. The skull was not implicated. The ulcerated surface was removed, the incisions being carried wide of its limits, and separated from the bones with the raspatory. The surface was covered with dry charpie. After six days, most of the dressing was loosened by the suppuration and was removed with the forceps, fresh charpie being applied. The patient, who up till then had been entirely free from feverish symptoms, had a severe rigor on the following evening. The next day symptoms of meningitis developed; paralysis of the right half of the body ensued with convulsions. She died sixteen days after the operation. Post mortem: "purulent meningitis over the entire left hemisphere; pus in the veins of the dura mater; the diploë corresponding to the seat of operation free from pus; the brain superficially infiltrated with purulent matter. A small abscess in the left lung. No secondary cancerous deposits."

I have no doubt that in this case the infection was due to the changing of the charpie dressing.

CHAPTER VI.

DISEASES OF THE EAR AND THE FRONTAL SINUS.

Cases of:—Caries of petrous bone. Epithelioma of inner ear. Of external ear. Congenital atresia. Distension of frontal sinus—Cases. Case of Hæmatoma of frontal sinus.

Ear.

Under this heading may be mentioned the case of a man who was admitted with purulent discharge from the ear, caries of the right mastoid process with abscess, and great pain. Some days after admission he had an apoplectiform attack. I enlarged the fistulous opening in the mastoid process with the chisel, but let out no pus. Extending my opening down to the dura mater subsequently, I thrust a very small, slender knife into the brain, in the hope of evacuating the contents of an abscess of the brain; no pus came. The symptoms remained unaltered, and the patient died shortly after. Caries of the petrous bone with purulent meningitis of moderate extent, and thrombosis of the right transverse sinus were found post mortem.

The following case of epithelioma of the inner ear I saw as a private patient, in consultation with Dr. Brunner of Zürich.

Frau M—, æt. 56, first consulted me in April, 1867. Her previous health had been good. For two years she had been troubled with frequent itching and tickling sensations in the right ear, and had been in the habit of constantly scratching the irritating surface in the auditory canal with the end of a hair pin. In the spring of 1866 there was some thin puriform discharge from the ear, with swelling of the walls of the canal, and impairment of hearing. For a time she employed hot water douches to the ear at a bathing establishment. The result of this was that she caught a violent cold, and came back to Zürich with further impairment of hearing, and pain in the ear. At the beginning of 1867 she noticed that her face was drawn to the left, and she therefore consulted a medical man, who found her suffering from right facial paralysis and purulent otorrhœa. He removed a granulating mass from the deep part of the ear with a vulsellum. The bleeding, which was considerable, was arrested by a plug of charpie, soaked in Liq. Ferri Sesquichlor. Intense pain and severe inflammation followed this proceeding, but yielded, after a few

days, to leeching, &c. She then consulted Dr. Brunner, who found her in the condition described, and removed a polypus-like mass of granulations which blocked up the external auditory passage. Examined microscopically, the growth was found to be undoubted epithelioma. When I first saw the patient the appearance was so exactly like that of caries of the internal ear that I could not be convinced till I had myself examined the growth, a portion of which was again removed. I could only confirm my colleague's dictum after examination. The growth was a perfect specimen of epithelioma. We came then to the conclusion that in all probability the growth had extended through the petrous bone and given rise to the facial paralysis. Neither the cervical nor the submaxillary glands were enlarged. Interference under the circumstances would obviously have been futile. As the disease extended, the parts about the tragus and the mastoid process became involved. The growth never protruded beyond the external auditory meatus. The pain increased so much that constant hypodermic injections of morphia were necessary, and she died of exhaustion a year after the commencement of the disease. Unfortunately no post mortem was permitted.

Epithelioma of the ear.

A. S—, æt. 50, male. Two years before admission some warty prominences formed on the left concha; these grew rapidly, and for three quarters of a year had been ulcerated. When first seen the entire ear was converted into a cancerous mass. The neighbouring lymphatic glands were not affected. The ear was removed, but the patient died of multiple pyæmia nine days after the operation.

A. B—, æt. 58. Ten years previously a small nodule had made its appearance on the left concha, which in the course of three years only attained the dimensions of a pea. The patient then received a blow on the tumour, which caused the growth to become very painful, and to ulcerate. When seen the cancer was the size of a bean, at the upper part of the concha. It was excised, and there was no recurrence eleven months later.

In the case of a child, æt. 3½ years, with congenital atresia and imperfect development of both ears, I endeavoured to make an auditory canal, but the attempt failed; the wounds healed without any trouble and the condition remained unaltered.

Miscellaneous.

Distension of the frontal sinus.

M—, æt. 49, very subject to obstinate colds. Three years before admission he had suffered from attacks of severe pain over the right side of the forehead, which lasted, as a rule, from about ten in the morning until the evening. A year

previously he had observed swelling over the right inner canthus, followed a few months later by considerable discharge of pus through the right nostril. This lasted for a time, and then the swelling was opened from the outside by v. Arlt, a quantity of pus being let out. A fistula was left, which was usually kept closed by a plug of charpie. On the removal of this, free discharge always followed. I cut away the anterior wall of the distended sinus, united the scalp wound over it, and left in a small drainage tube. The pain and swelling completely disappeared after this proceeding, but five years and a half later there was still some discharge through the fistula.

M. A—, a weekly child, æt. 11, was brought to me with distension of the right frontal sinus, and some exophthalmus, which had existed for six months. On making an opening the sinus was found to be filled with exuberant granulations. These I removed with a raspatory. He recovered slowly, and after some months the fistula closed. Five years later I heard that the sinus had not reopened, but the exophthalmus was unaltered.

In the case of M—, æt. 38, distension of the left frontal sinus, accompanied by severe headache, had commenced sixteen months previously, without known cause. Some weeks after its formation the swelling broke under the left supraorbital notch, and pus was discharged. The resulting fistula closed at times, but then swelling and pain came on, which were relieved when the discharge again took place. With the probe I detected a sequestrum lying loose in the cavity; I dilated the fistula and extracted the loose piece. The suppuration then decreased considerably, but a fortnight later the fistula had not closed. She then left, and further particulars of the case are wanting.

A male, æt. 56, had received, three months previously, a wound at the root of the nose, from a bull's horn. The wound was sewn up and soon healed, but a knob of granulations formed at the right inner canthus, which became moist and prominent from time to time. After removal of the little outgrowth, we found an opening leading into the right frontal cavity. The fistula was dilated, and a small drainage tube inserted. Although the tube was worn for a long time, and only finally taken out when the secretion had ceased, the fistula was still discharging, about eighteen months after.

A male, æt. 78, had been troubled for six months with a swelling at the inner part of the upper right lid, which at first was hard and painful. After a short time it broke spontaneously, and discharged pus. As the purulent discharge from the fistula persisted, I cut away the anterior wall of the right frontal sinus, and stuffed the cavity with charpie, soaked in acetate of alum. The discharge, thereupon, gradually ceased, and the fistula completely closed up after some months. Two years after he was well and free from pain.

Hæmatoma of the frontal sinus.

K. S—, æt. 7, was operated on December, 1870. Healing followed after excision of the anterior wall. The eye was lost.

KING'S COLLEGE LONDON

CHAPTER VII.

INJURIES AND DISEASES OF THE FACE, MOUTH, AND NASAL CAVITIES.

Section A.—Miscellaneous.

Case of luxation of the eyeball. Cases—epistaxis, malignant carbuncle. Remarks on periostitis of jaw. Case of suppuration of antrum. Lupus—recurring after rhinoplastic operation. Chronic infiltration of cheek—Case treated by arsenic. Case of hypertrophy of tongue and cavernous lymphectasis. Case of spontaneous gangrene. Case of atresia of nasal cavities. Hypertrophy of nose. Remarks on removal of tonsils. Two cases of syphiloma. Cases of tubercular disease of tongue. Case of paresis after ligature of the carotid. Case of parasitic sycosis.

Luxation of the eyeball.

F. M—, æt. 23, was struck in the eye by a stick during a drunken brawl, and thrown backwards against a tree, whereby he suffered an abrasion and a contusion over the left temporal region. The patient slept off the effect of his debauch, and came up on the following day to the hospital. We then found that the left eyeball protruded to such an extent that it was entirely uncovered by the eyelid. Both eyelids were curled up inwardly, and lay behind the eyeball, which projected and was twisted downwards to some extent. Much blood was extravasated beneath the conjunctiva. A trace of movement in a vertical direction remained. All lateral movement was lost; vision was completely destroyed. No examination was made with the ophthalmoscope, or, at any rate, none is recorded. The condition clearly answered to that which has been termed luxatio bulbi. An attempt to replace the eyeball into the orbit failed, for the outer and inner commissures were torn. Suppuration and shrinking of the eye followed, in consequence of which it was slowly retracted into the orbital cavity.

Severe epistaxis was seen in a man sixty-two years old, coming on after violent sneezing, and proceeding to faintness and loss of pulse. No disease of the bone could be made out. The posterior nares were plugged by means

of Bellocq's tube. No return of the hæmorrhage after removal of the plugs five days later.

A case of malignant carbuncular infiltration of the nose and forehead, was met with in a young man, who had probably had typhus recently. He had severe cerebral symptoms. The disease terminated fatally on the sixteenth day after the redness and pain was first observed. Three weeks before this disease was noticed he had been laid up with much abdominal pain. Post mortem: we found purulent meningitis on the under surface of the anterior lobe of the brain, superficial softening of the grey matter, and metastatic abscesses in the lungs. Some cicatrising ulcers were found in the intestine, close above the ilio-cæcal valve.

Periostitis.

Twenty-three cases of subacute periostisis were under observation, all of which originated from carious teeth; most of these led to the formation of large abscesses which, in spite of incisions made internally, frequently broke also externally. None of these were followed by necrosis. The bone is seldom found exposed after such abscesses have been opened. I think that they originate in most cases in the loose cellular tissue of the outer layer of the periosteum,[1] starting from the local infection caused by the carious teeth; the ichorous discharge extends outwards from the sockets of the teeth, first in the alveoli, then through the bone (by means of the lymphatics?) to the periosteum of the jaw; here then inflammation is set up; the extensive œdema and the pain, the latter being frequently severe, give rise to much distress.

Suppuration in the antrum.

In a man æt. 40. The purulent discharge had existed for three years. The antrum was freely laid open through the alveolar process, and a piece of laminaria was discovered in its cavity. Repeated attempts had been made a year before to dilate the sinus with laminaria tents; no doubt the fragment was broken off at the time, and remained unnoticed ever since. A drainage-tube was kept for a long time in the opening. In spite of careful washing out of the cavity the suppuration, two years later, had not completely ceased, although no sequestrum or caries could be discovered in the antrum; the swelling and pain, however, subsided.

The other case was that of a man æt. 30, who for some months, had had dull pain in the right upper jaw. Eight months previously pus came through an opening which formed in the canine fossa. The opening into the antrum

[1] See Appendix II, infra.

was enlarged and a drainage tube inserted. The pain and swelling had completely disappeared when he was discharged and the suppuration was very slight in amount.

Lupus.

While at Zürich I met with fifteen cases, all females—one a child. My usual treatment for this affection consists in destroying the diseased surface with caustic potash, taking care that the action extends well into the sound tissues. In one instance I removed with the knife a tubercular, hypertrophic lupoid growth from the corner of the mouth of a woman aged 45. Although the whole of the diseased tissue was removed, it recurred locally a few months after. I then destroyed it with caustic. The patient died six months after of tuberculosis.

Lupus recurring in a newly-formed nose.

C. J—, æt. 45, had suffered from lupus of the nose from her youth, which had completely destroyed the organ. Fourteen years previously a complete rhinoplastic operation had been performed from the forehead, with a very good result as far as the appearance was concerned. When admitted there were numerous scattered nodules about the nose and in the neighbourhood of the cheek. The patient was transferred to Professor Hebra's wards.

Cases of chronic infiltration of the cheek with granulation material (granulations infiltration) were not uncommon at Zürich. They occurred chiefly in children, and were characterised chiefly by the breaking down and suppuration of the central parts, leading to the formation of an ulcerous cavity. By clearing off the skin, scraping away the spongy granulations, and applying caustic potash, rapid healing was induced and good cicatrices were left. A few years ago an enthusiast on the subject of tumours described these infiltrations as a new kind of myxoma.

The following case is worthy of record as an illustration of the remakable effect of arsenic. The etiology of the disease could not be positively made out.

E. B—, æt. 37. Her father was confined in a lunatic asylum; her mother died in the hospital of some disease of the stomach. She herself had enjoyed good health up to the age of 21. The catamenia then came for the first time, but did not occur subsequently. She was subject to frequent acute abdominal

pain. Four years before her admission, from no assignable cause, an abscess, the size of an egg, formed over the left side of the vault of the skull and opened spontaneously a year after its first appearance; a large quantity of thick pus was discharged and the abscess then rapidly healed. During the following years similar swellings appeared, at one time in the right, at another in the left infraorbital region, then deep in the neck; none of these went on to the formation of abscesses; they came and went slowly, and without pain. For four months there had been swelling and redness of the nose; for three weeks the nose had been stopped up and had discharged a good deal of thin pus. She denied any syphilitic taint, and there were no appearances of this disease.

The patient was of weak frame, pale, indolent, and of dull intellect. The nose was red and swollen; on the right side of the cheek, close to the nose, was seen a circular ulcer, the size of a shilling, with sharp edges, covered with breaking down diphtheritic granulations, on which was some serous secretion. The mucous membrane of the nose was swollen.

Prompted by the appearance of the ulcer and the recollection of other cases, we tried antisyphilitic treatment (Decoct. Zittmanni) for a time. Then as the ulceration spread caustics were employed and iodide given internally. This treatment was continued for nearly five months; meanwhile the disease extended. As a purely empirical experiment, I now gave ten drops of Tr. Fowleri thrice daily. Improvement at once commenced and the parts began to cicatrise. She left in six weeks' time with the ulceration healed, though, it is true, with considerable deformity of the nose.

To my mind the marvellous improvement that followed the exhibition of the arsenic was a lamentable defeat for rational therapeutics. Was the morbid process of a syphilitic, a scrofulous, or a lupous nature? Who could decide? The disease was the result of a dyscrasia, which was destroyed by the arsenic. As a matter of fact, we can as yet offer no explanation for the frequently remarkable effects of arsenic in chronic affections of the skin.

Unilateral congenital hypertrophy of the mucous membrane of the cheek and the upper surface of the tongue, combined with cavernous lymphectasis.

B. H—, æt. 10, was born with the following deformity which had not materially altered since his birth. The right cheek was considerably thicker than the left, the thickening being chiefly limited to the mucous membrane and the submucous tissue. The right half of the tongue was covered with papillæ, from one to two lines in height, arranged in groups and covered by a thick layer of epithelium. All these parts had increased proportionately with the growth of the body, but without having any special growth in themselves. From time to time the cheek and tongue swelled, and occasioned difficulty in swallowing. These attacks usually lasted two or three days, and then gradually

disappeared. The last attack was of so severe a nature and was associated with so much difficulty of breathing that the parents sought for advice. I diagnosed hypertrophy of the cellular tissue and fat, united with cavernous lymphectasis. My experience of these kinds of congenital tumours led me to conclude, from the periodical swelling, that the latter condition existed. All material symptoms indicative of a cavernous blood tumour were wanting. I employed punctiform cauterisation with the galvano-cautery, and took the opportunity to destroy the papillary formations of the tongue at the same time; similar applications were made at intervals of from two to three weeks, and by this means the whole tumour of the cheek was diminished in size, and the growth on the tongue destroyed. The reaction following the first cauterisation was slight in character. After the third operation, where the cautery was applied rather more energetically, great swelling of the cheek and parotid gland ensued. The parotitis was tolerably severe, lasting about three weeks, and finally ended in resolution under treatment with iodide; meanwhile the tumour of the cheek had become somewhat smaller. Later reports stated that his condition some time after he had left the hospital, remained the same. He was free from the painful swelling which formerly occurred. Five years later he came back, in order to have the rest of the excrescence removed; excepting a slight thickening of the cheek his condition was perfectly normal.

Gangrene of the nose.

In the winter of 1862 a young man was admitted into the hospital for gangrene of the end of the nose, said to have been caused by frost-bite. After a time spontaneous gangrene of the feet set in; the cause could not be completely made out.

I think that these cases of spontaneous gangrene can only be explained by great anæmia and feebleness of the heart. Further remarks on this subject will be found in the chapter on "Diseases and Injuries of the Lower Extremity."

Atresia of both nasal cavities.

This condition was seen in a girl, 3 years old, the result of cicatricial contraction after variola. The cicatrices were cut out and the openings dilated by laminaria tents. India-rubber tubes were passed in, and ultimately the normal width of the nasal cavities was completely restored. I do not know whether recovery was permanent; I rather fear that it was not, for the mother, who was a poor woman, probably had no time to attend to the directions which were given to her, of keeping the parts clean and introducing the tubes every day, for some months.

Hypertrophy of the Nose.

The drawing (Plate I, fig. 4*a*) was taken from a highly intemperate man, aged 54, who for fifteen years had suffered from gradually increasing redness and swelling of the nose. Fig. 4*b* shows the same patient after operation, which was not followed by erysipelas; the cartilages were carefully preserved. The growth consisted of soft, elastic integument, with numerous dilated sebaceous follicles.

Plate I, fig. 3, illustrates the same condition; the patient would not submit to any operation.

Removal of Hypertrophied Tonsils.

I always remove tonsils with a sharp double hook and a straight or curved probe-pointed knife, as I was taught by von Langenbeck. In one case very formidable hæmorrhage occurred during this operation, which I have performed I know not how often. On removing the left tonsil in a young hysterical lady, an immense gush of blood occurred and partly descended into the larynx. I attempted in vain to introduce my finger into the mouth so as to exert pressure on the bleeding spot; the patient would not allow this proceeding. I instantly, therefore, made pressure on the carotid artery and kept it up for some time, while the patient retched fearfully. After a while the bleeding stopped; the scene was, however, so unpleasant for the patient, as well as for myself, that I should wish to preserve everybody from a similar mishap. Being desirous of removing the tonsil thoroughly, I had drawn it rather too far forward, and had in this way drawn out also and cut off a fold of mucous membrane from the side and back of the pharynx. The blood appeared to come from this wound, evidently from some large branch of the pharyngeal artery. Care should, therefore, be taken to avoid drawing forward the tonsils too much.

Two very curious cases of syphiloma.

A. B—, æt. 9, had suffered, according to his own account, for two months from a flat, firm infiltration of the left upper eyelid. The skin covering it was

of a reddish-blue colour; a lymphatic gland, the size of a hazel-nut, could be felt in front of the left ear. Over the whole body, was seen a distinct, well-marked roseola; no fever. The infiltration in the eyelid was considered by some of my colleagues to be cancerous. I did not share this opinion, but at first could not form any diagnosis. From the skin disease, and later on from other conditions which assisted our diagnosis, we concluded that the swelling of the eyelid was of syphilitic origin, although no syphilitic infection could be proved. In the sequel, the case became very complicated. At the outset, iodide of potassium was given internally. In three weeks the infiltration of the eyelid had nearly disappeared. A few days later, the child was attacked with severe symptoms of meningitis, with vomitings, cramps, and finally complete coma. The case seemed desperate; ice was applied, and large doses of calomel given. About the fifth day of the disease consciousness returned, and gradual recovery ensued. When the patient was discharged, a fortnight later, at the wish of his parents, the exanthem had disappeared, and only a slight swelling of the eyelid was perceptible. I am unable to say whether further symptoms of syphilis followed later on.

S, C—, æt. 26, was received as an out-patient with a tumour, connected to the septum narium. The growth was of soft, elastic consistence, almost fluctuating, and had the circumference of a small walnut. Under the impression that it might be a cyst, I punctured it with a fine knife, but only blood was let out. I concluded then that it was a sarcoma, and the patient was admitted for operation. On further examination an extensive brownish exanthem was found over the whole body, and enlargement of the cervical glands. In answer to inquiries, he stated that some years previously he had had a chancre. Antisyphilitic remedies were now employed, since it seemed in the highest degree probable that the tumour on the nose might be a syphiloma. The patient, however, was attacked with erysipelas starting from the little puncture on the nose, and died of pyæmia. Post mortem: the tumour of the nose was scarcely perceptible, as it had disappeared during the erysipelas. Nothing further was found to clear up the diagnosis.

Tubercular nodules and ulceration of the tongue.

Both the following cases presented great difficulties in diagnosis.

J. M—, æt. 53, had suffered for six months from dry cough and nocturnal sweats, with occasional slight hæmoptysis. Six weeks previous to admission he had noticed, in the middle line of the upper surface of the tongue, a nodule, the size of a pea. This sometimes was very painful, and had gradually increased up to admission. It was then the size of a hazel nut and the mucous membrane covering it was fissured.

The majority of those who saw the case considered it to be a syphiloma. The administration of iodide of potassium in moderate doses for three weeks had absolutely no effect on the growth. I then concluded it might be a carcinoma, and removed it. The wound healed rapidly, but the patient died three weeks

later of tuberculosis of the lungs and intestines. The base of the ulcer of the tongue proved to be a fatty small-celled infiltration between the bundles of muscle, around which lay a ring of breaking down miliary tubercle.

P. A—, æt. 38, a strong, well-built man, was admitted with a history of numerous attacks of hæmoptysis two years previously, followed by severe bronchial catarrh lasting nearly nine months. He had been relieved by long-continued "curd treatment." The appearance, the formation of the thorax, and the well-nourished condition of the man, were such that his statements seemed scarcely credible. Nothing abnormal could be found after careful percussion and auscultation of the thorax. Five months previously he had first remarked a small fissure on the upper surface of the tongue, which gradually increased, and on admission was nearly three quarters of an inch long and about a line and a half in depth. The patient denied any syphilitic infection. The fissure-like ulcer had nearly healed after repeated energetic cauterisation with argent. nit., when the patient left for private reasons. Subsequently the small ulcer completely closed up, leaving only a slight trace. For a time it remained unaltered, but six months later, it again began to increase and became wider, more rounded, and extended in all directions. On the second admission of the patient, the anterior and right half of the tongue were occupied by an ulcer with hard sinuous edges and irregular base. The appearance of the ulcer led me to suspect that it was most probably syphilitic, and accordingly iodide of potassium was given. The use of this remedy for two weeks exercised no effect on the ulcer. Microscopical examination of a piece cut away from the edge proved decidedly that it was not cancer. The application of caustic potash on two occasions had a better effect, and brought about partial healing, but soon afterwards the ulceration resumed its former aspect. He suffered now from nocturnal fever and bronchial catarrh. The patient left unimproved, became terribly emaciated, and died a few months later of tuberculosis of the lungs.

Paresis after ligature of the common carotid artery.

M. M—, æt. 24, was brought to the hospital, when 17 years of age, for a naso-pharyngeal polypus. This was removed with the galvanic wire loop. Two years later it returned. The tumour, which was situated also in the pterygoid fossa, was then again removed with the knife. Ten days after the operation severe hæmorrhage occurred, probably from the internal maxillary artery. For this the left common carotid was ligatured. Almost immediately after the operation the patient had pain about the forehead, and dilatation of both pupils, principally of the left, with partial loss of power in the right hand. A few hours after the operation speech was lost. On the second day right paraplegia was noticed; bed-sores followed in several parts. Five weeks later the condition was as follows:—On the right side paralysis of motion, sensation normal; no facial paralysis; the pupils contracted slowly to light; the tongue could be well protruded; speech imperfect, and articulation defective. Urine and fæces passed involuntarily.

Fourteen months later, he came back; he could then walk, but with a dragging gait; the sphincters were now under control, and the paralysis of the upper extremity was improved; in other parts it was unaltered.

Six years after the ligature of the artery I saw him again. There was then a good deal of wasting of the right side, especially of the arm; he could not pronate nor supinate the hand, and the fingers were flexed; the sensation of the skin and muscles was greater on the affected than on the sound side, and the reaction to an electro-motor stimulus was also greater on this side. Faradisation was employed to the arm, and a constant current along the course of the left sympathetic in the neck. Distinct, though slight improvement, followed this treatment.[1]

Parasitic sycosis of the chin.

This disease was met with in the person of a small house proprietor in a Hungarian village, who tended his cows himself. The disease was new to me. There was an ulcer, the size of a florin, somewhat resembling epithelioma, but with soft edges; pus, not unlike the matter in comedones, could be pressed out, especially from the root sheaths of the hairs of the beard, over the diseased parts. The hairs came out very easily; on their sheaths were many fungi, somewhat larger than the spores of herpes tonsurans. Recovery soon followed on the removal of the hairs and the application of a mixture of sulphur and glycerine.

Section B.—Neurotomy and Neurectomy.

Case of neuralgia of the infra-orbital nerve; neurotomy. Case of neuralgia of the fifth nerve, treated by repeated operations; death. Cases of neuralgia of the fifth nerve, treated by neurectomy and neurotomy. Case of neuralgia of third division of fifth nerve; hæmorrhage after operations; ligature of carotid; optic-nerve atrophy. Remarks on neuralgia of the fifth nerve. Etiology. Treatment. Neurotomy. Neurectomy.

Herr B—, æt. 46, had for twelve years suffered from neuralgia of the right infraorbital nerve; the attacks of pain, which were accurately limited to the distribution of this nerve, were excited by touching the cheek with the tongue by eating, plucking the beard, &c. Owing to the complaint the patient was only able with great difficulty to gain his livelihood as a clerk and writing master. No cause could be assigned for the affection; in other respects he was perfectly well. The teeth were unusually perfect and good. He had

[1] The case will be found fully recorded in Prof. Schuh's collected works, p. 906. In the 'Archiv für klin. Chir.,' Bd. xiii, p. 379, is recorded an interesting case of epileptic attacks following injury of the right sciatic nerve.

consulted numerous medical men, and the bundles of prescriptions exhibited were evidence that all the usual remedies had been tried. In July, 1863, I divided, subcutaneously, the infraorbital nerve at its exit from the canal at several points (Zerschneidung). From this time forth he was free from his attacks, his cheerfulness returned, and he was able to resume his avocations. This lasted for a year and a half. Then, slight momentary darting pain in the nose began; these slight paroxysms were accompanied from time to time by swelling of the mucous membrane of the right side, but without causing much discomfort.

In February, 1866, my patient came back, stating that his complaint was more an inconvenience than a disease, but he desired that the section should be again performed that he might be rid of the trifling attacks. In February, 1867, I divided the nasal branch of the infraorbital subcutaneously. When I saw him again in July, 1867, he was, and had been, completely free from the attacks. Any one who had seen this man then, and also at the first, would have called the result a brilliant one, even if the neuralgia were subsequently to return.

From a surgical point of view the following case of neuralgia is probably unique:

Herr E—, æt. 60, was admitted in March, 1864. Considering his age, he was robust, muscular, and energetic, and had previously enjoyed good health. Two years previously he had first experienced pains of a sharp nature in the left cheek and the teeth. These occurred at such long intervals that they were thought to be rheumatic. This view was further strengthened, as each attack was accompanied by flushing of the face, especially on the left side; this likewise was thought to be due to his having caught cold. Soon, however, the attacks became more frequent, first every week, then every second day, finally daily; for four months the paroxysms came on several times daily, being excited often by speaking, masticating, stroking the beard, or pressure on the part. The spasms of pain never occurred unless the patient excited them by some movement or touch. So long as he had sufficient control over himself to be perfectly still in bed, he was able to sleep soundly through the night; the spasms never occurred during sleep. When admitted he was unable to eat or drink without bringing on an attack. The pain during the spasms extended over the left cheek and upper lip, the upper jaw and the teeth, and varied in intensity and duration. He distinguished slight and severe attacks.

When the disease began he had some diseased molar teeth in the left superior maxilla. Thinking that the pain might originate from these teeth, he had them extracted on different occasions, as well as some other teeth on the left side. However, the removal of the teeth did not improve matters. All kinds of remedies, internal and external, such as quinine, steel, arsenic, iodides, veratrum, &c., were tried without success. Subcutaneous injections of morphia alone gave benefit; gradually the amount of morphia thus administered

had to be increased, until not less that two scruples daily were necessary to keep him free from pain. As a result, he had repeatedly symptoms of morphia-intoxication such as Nussbaum has described, and which that authority attributes to the direct passage of the morphia into the blood.

The patient earnestly begged for an operation. On the advice of Professor Griesinger, however, we first tried local bloodletting, which had not previously been employed; four leeches were applied. Not the slightest improvement followed; on the contrary, the parts in the neighbourhood of the leech-bites became inflamed, and more morphia than ever had to be administered. No particularly painful spots could be discovered, except that in certain points in the toothless left upper jaw pressure caused rather more pain than elsewhere. Pressure, however, did not produce an attack. Under the circumstances I should have preferred subcutaneous section of the infraorbital nerve at its exit from the jaw; the patient, however, so urgently entreated that the most radical operation possible might be performed, that I extirpated the portion of nerve lying in the infraorbital canal, in the usual way. The portion removed measured three quarters of an inch; neither with the naked eye nor with the microscope could anything morbid be discovered in it. For a few days only after this operation did the patient remain free from pain; the old troubles then recommenced, though it is true that they were less frequent and less severe. Touching, or stretching of the angle of the mouth, touching or pressure on the ramus of the upper jaw now excited the spasmodic attacks; the dragging pains extended backwards to the palate, thence into the pterygo-palatine fossa and the temporal region; curiously enough, the distribution of the infraorbital nerve remained free from pain. The attacks shortly became more severe, and it was found necessary to revert to the anodyne injections; these had a magical effect, but had to be repeated often during the day.

Further minute examination convinced me (1) that the affection was only in the course of the second division of the fifth nerve; and (2) that the pain was always reflex and originated in peripheral excitation. The remarkably prompt effect of the local narcotic injections on the peripheral branches seemed to me to confirm the hypothesis of some peripheral affection. With this idea, I conceived that I might benefit the patient by severing the second division of the fifth nerve at the foramen rotundum, and dissecting away such adjoining branches as could be reached. Such a proceeding appeared to me possible enough with the aid of v. Langenbeck's osteoplastic resection of the superior maxilla. At the time I thought that I was the first to develop this bold idea in a methodical manner, but found that Carnochan and Nussbaum had already performed such operations with success.

Following Professor Griesinger's advice, however, I removed (on the 12th May, 1864) with bone forceps and gouge, the alveolar portion of the upper jaw which was painful on pressure. I could not well anæsthetise the patient, as it was necessary for me to know what portions of the jaw were painful. In two places I came upon unobliterated alveoli filled up with granulation tissue, the touching of which straightway occasioned the paroxysms of pain; these granulations and the parts in their neighbourhood were

removed. The patient bore this terribly severe procedure with firmness, but he was rewarded, for after this operation the attacks ceased. He was restored, as it were, to a new life, left on the 27th of May, and resumed his work as a ranger.

For three quarters of a year (up to February, 1865) he continued perfectly well; then, though at long intervals, slight symptoms began, recalling the former attacks. As before they were attributed to external causes. His condition was tolerable, and he was able to pursue his avocations. In the autumn of 1865 the attacks of pain began to increase in frequency and severity (about one and a half years after the last operation) and in February, 1866, his condition became so unendurable that he was unable to continue his work any longer. In the meantime he had tried every sort of remedy but had lost confidence in everything except a fresh operation, and with this object he came back to the hospital. During the paroxysms the cheek was now free from pain, but all the other parts supplied by the second division of the fifth nerve were affected. Rest could only be procured by very strong morphia injections. In February, 1866, I performed v. Langenbeck's osteoplastic resection of the superior maxilla, and broke away the posterior wall of the antrum and the back part of the floor of the orbit. Next, the second division of the fifth was traced up, and the orbital dental branches sought for; the trunk of the nerve was cut close to the foramen rotundum. I then drew the nerve forward, separated the branches for some distance and completely removed the infraorbital nerve. The operation entailed but little hæmorrhage. The portion of bone was replaced and united well, as did also the wound. Reaction was moderate. After this the attacks of pain ceased.

On examination, the entire trunk with its principal branches was found to have been removed, but unfortunately the spheno-palatine ganglion was left. In similar cases I should consider the removal of this ganglion of importance. Microscopically no pathological appearances could be detected.

Towards the end of March, 1866, the neuralgic symptoms unfortunately returned again, on any touching or stretching of the left angle of the mouth; soon the attacks became more frequent. I then determined to resect the buccinator nerve, which, though a branch of the third division, is partly a nerve of sensation, and supplies the angle of the mouth and the mucous membrane. Although the trunk of this nerve was readily found in the dead subject, yet, in the cicatricial tissues of the patient's cheek, it cost me a long search to discover and excise a portion of the nerve. I was unfortunate enough, in searching for the nerve, to divide Stenon's duct close to its exit from the gland. This was in April, 1866; the neuralgic pains completely disappeared, but the patient had an attack of erysipelas ambulans; this latter he got over well, but was left with a salivary fistula. In May, 1866, a month later, the neuralgic pains again appeared about the upper jaw and in the neighbourhood of the chin. I then made an incision from the mouth towards the lateral wall of the antrum, carry-

ing it pretty far back, so as to meet with the posterior dental nerves; the mental nerve was also cut through at its exit from the infra-maxillary canal. The first incision was followed by sharp hæmorrhage, which could not be checked until the patient was much exhausted. At the end of May, 1866, I attempted to close the salivary fistula by drawing the stump of the duct into the mouth, and uniting the skin over the opening, but without success. It then occurred to me to place a ligature round the duct and allow the gland to atrophy, but as we know that wounds of the gland substance heal readily after excision of the jaw or removal of tumours, I decided to remove the anterior portion of the gland; the skin wound was united over the gap. About five days subsequently the gland began to swell and, as it increased in size, became highly painful. Pressure was tried without good result; suppuration took place, and the entire gland became converted into a multitude of little abscesses, the last of which did not heal for two months. The patient then left the hospital free from his neuralgia.

For five months he continued well; then the old troubles began again in December, 1866. In January, 1867, he suffered from severe attacks. In April and May of the same year a remarkable improvement took place, but in June the pain returned with its full severity. The attacks of pain now ramified for the most part from the alveolar process of the left superior maxilla over to the nose, the lower eyelid, the ear, and the temple; thence the pain penetrated deep down into the head. The paroxysms occurred during eating, talking, &c., but never when he kept absolutely quiet. In July, 1867, he returned and besought a further operation. The constant current was suggested, but the patient would not hear of any proposal short of operation. Life had become a burden to him. I therefore, in July, 1867, tied the left common carotid artery above the omohyoid. My patient was at that time in his sixty-fourth year; in spite of all his sufferings he was vigorous for his age, cheery, and of indomitable bodily and mental energy. A few days after the operation he had slight attacks of pain, which then diminished, and entirely ceased at the end of the first week after the operation. The patient became a new man; he would not remain in bed, and left seventeen days after the operation, although the ligature had not come away.

The further history of this case was communicated to me. I learnt that recurrence took place, and the constant current was tried with success. The paroxysms then came back again, and up to his death were of agonizing pain. Enormous doses of morphia were given. The small subcutaneous syringes were useless, and he procured one that held two drachms. He was accustomed to inject 18 grs. of morphium twelve times daily. By means of this he had intervals when the pain was endurable, and could get sleep for an hour or two. Finally he became reduced to a skeleton, and died of exhaustion. Post mortem: absolutely no morbid change could be detected in the nerves, the brain, or the bony canals.

It appears to me beyond question that the operations were the means of prolonging this man's life, or, at any rate, of making it tolerable for some periods. From the scientific point of view the negative results of the post-mortem examination are very disheartening.

The duration of the disease, dating from the commencement of the neuralgia to his death, was seven years.

Do these two cases encourage us to undertake operations for neuralgia or not? The first, as it seems to me, speaks strongly in favour of neurotomy; in the second, a radical cure seemed scarcely possible, since no drugs—the subcutaneous injections excepted—had any power of alleviating, still less of curing the disease. By the operations the patient was repeatedly benefited, so that he passed many months free from pain. I am convinced that, had it not been for the operations, he would long before have put a bullet into his brain, for he was quite the man to do so. For mine own part, when the neuralgia is produced chiefly in a reflex manner, I should uot hesitate to proceed as I did in the cases described. If fresh recurrences took place and electricity failed, I would again excise the painful portions of the jaw, render the affected half of the face insensitive by cutting through the supplying nerve trunks, perhaps again ligature the carotid artery, and so forth. Mechanical treatment, such as this, and directed purely against symptoms, may be called irrational. Let us not deceive ourselves. Are we not perpetually in the same position with regard to internal diseases, where we can only alleviate the painful symptoms? Our patients will thank us more for alleviating their sufferings, even by an irrational mode of treatment, than for a 'rational' therapeutic nihilism.

Neuralgia of the fifth nerve.

The two following cases are instances where the pain started from some manifest lasting irritation, but where there were no decided paroxysms.

F. H—, a woman, æt. 19. The left eyeball had been enucleated a year previously, and a right iridectomy had been performed for glaucoma. For seven weeks she had had intense, but not continual, pain in the tract of the right frontal nerve. This nerve was divided and the pain in the forehead ceased, but became subsequently much more intense in the right eyeball, and then in the track of the right supra-maxillary nerve. The constant current

was tried without success. Gradual alleviation of the paroxysms was obtained by the repeated use of morphia injections, and four years later her condition was tolerable. The condition of the right eyeball did not alter.

K. W—, æt. 25. After an attack of typhus, a dull pain persisted over the right half of the forehead. There were no typical paroxysms, and the man probably had catarrh of the frontal sinuses. The patient had, the year previously, suffered from epileptiform attacks. No operation seemed to me to be indicated in this case, and the patient was discharged unimproved.

A. B—, æt. 53. Pain had existed for twelve years over the distribution of the second division of the fifth nerve. In May, 1872, subcutaneous discission was performed on the nerve at its exit from the infraorbital canal. Four months later the pain recurred. In November, 1873, the operation was repeated. He recovered, but recurrence again took place in three months. In March, 1874, the whole nerve was cut out of the canal. The patient wrote, three years later, to the effect that his pain had not altogether disappeared, as he always felt some slight twinges in cold weather; however, his condition was materially improved in comparison to what it had formerly been.

In two other cases the same nerve was completely extirpated out of the canal. Recovery followed, but nothing could be heard of the patients on inquiry three years later. In one of these cases subcutaneous discission of the nerve at its exit from the canal had been quite unsuccessful in relieving the pain.

M. H—, æt. 43. Neuralgia had existed on the right side for ten years. A portion of the inferior dental nerve just above the canal was cut out. A few days later severe arterial hæmorrhage took place from the wound, which was so formidable, in spite of a tampon, as to necessitate ligature of the right common carotid artery. Three days later the hæmorrhage again occurred; a firm tampon of penghawar finally controlled the bleeding. The patient was much exhausted by loss of blood, and recovered but slowly. An abscess subsequently formed behind the angle of the jaw; it was opened, and the bone was found exposed. Three weeks after the operation he had a rigor, and five days later he became completely blind in the right eye. The retinal veins were found to be enormously distended, the arteries were very small, and extravasation was seen in the neighbourhood of the macula. Atrophy of the optic nerve followed later on. Eventually he recovered after the removal of a sequestrum from the bottom of the abscess. Six months later we heard that he was perfectly strong and had had no further neuralgic attack, but the eye, of course, remained blind.

Neuralgia of the Fifth Nerve.

Between the years 1860 and 1876, thirty-two cases of neuralgia of the fifth nerve, came under my care.

Strange as it may seem, these typical neuralgias usually arise without any known cause. A cold was several times given as the origin, but in two-thirds of the cases the patients could assign no cause whatever. The first, "tearing," "twinging," "darting," and the slight and great "burning" sensations, came on quite unexpectedly. Patients with tic douleureux are very sensitive to cold, especially to cold draughts playing on the face. Usually they muffle up their faces in wool, and move about as little as possible. Once I succeeded in inducing a patient to apply an ice-bladder on the affected part of the face for some few days, and to rub the skin of the face once daily with ice. The pains increased to such a degree, in spite of the administration of morphia injections at the same time, that the treatment had to be discontinued. In no single instance have I seen any benefit derived from blood-letting. Sex appears to have a great influence on this disease, for it is so infinitely more common in men, that any chance of coincidence can be excluded from the compiled statistics. Among thirty cases, the neuralgia commenced in thirteen, between the ages of 30 and 40, and in eight others between 41 and 50. The nerve most commonly affected is the second division. At first we invariably examined the nerves when cut out, but as we could neither discover anything wrong with the naked eye, nor with the aid of the microscope, the examination was afterwards discontinued.

The disease, like many other spasmodic complaints, appears always to be purely functional. No case has occurred to me hitherto, in which tumours, exudations, etc., caused symptoms of tic douleureux by pressing upon or stretching the branches of the nerve itself, or any portion of the central nerve system. The nerves, at their exit from the spinal canal, might be compressed by diffused tubercular or cancerous disease of the vertebral column; but this will not cause neuralgic attacks as in tic, though of course, the pain in these cases is really very intense. True neuromata are usually only painful when touched. The few examinations of the brain, which have been made on persons who died with neuralgia of the fifth nerve, showed nothing, so far as I know, to elucidate the

disease. In these examinations there is perhaps a tendency to find something pathological *à tout prix*, which otherwise would scarcely have been thought deserving of mention. My own impression is, that the pains are commonly excited in a reflex manner, and that the apparatus for stopping such excitation has, as it were got out of order, from some unknown cause.

It would be very desirable to know whether the constant current or neurotomy could, at any rate, in some few cases, effect a radical cure. What, again, is the percentage of the cases under treatment, where permanent benefit is derived from neurectomy or from neurotomy? Is the result more decided and more lasting when the patients are operated on early or late? Should our prognosis vary, according as the first, second, or third division of the nerve is affected? An enormous array of statistics would be necessary, in order to give a general answer to these questions. What do we mean when we say that a neuralgia has been radically and permanently cured by operation? Ought it to signify "as long as the individual lives after the operation?" When patients operated on die, say from typhus, some months after the operation, during which period they have been free from pain, nothing is proven as to the radical cure effected by the treatment, although the good effect lasted up to the death of the patient. In a disease, where sometimes for periods of years, no symptoms occur, and which sometimes disappears altogether just as it originated, from no known reason, or again, perhaps five years after a successful operation, suddenly comes back with intense severity, it is difficult to form any opinion as to the radical effect of any form of therapeutical treatment.

In the majority of cases, it is true, the attacks of pain ceased to occur after operation. But the question arises, for how long? It would be of great importance to find this out. I have given the point my utmost attention, but at the very outset one is met by serious difficulties; about many patients no subsequent history is obtainable, and when they do communicate, their descriptions are usually of little value. Generally speaking, the attacks return, but with less severity; it is very difficult, however, to learn the amount of improvement by means of correspondence with the patients. For the present, therefore, I prefer not to attempt to lay down any rules on the matter. Subjoined is a *résumé*—imperfect, as I am well aware—of the results of special forms of treatment and operations.

Spontaneous cure.

In the case of a man who had suffered for eight years from neuralgia of the second division of the fifth nerve, the pain gradually ceased without any treatment. When I saw him last he had been for four months completely free from attacks.

Another man, who had suffered for eleven years from neuralgia of the second division of the fifth nerve, broke through some ice and fell into the water; thenceforward, for a period of eight months, his attacks ceased. At the end of that time the neuralgia returned. He was then attacked with typhus, after which the pains ceased again, but returned once more, though with somewhat weakened intensity, six months later. He improved remarkably then under morphia injections.

Constant Current.

In eleven cases the constant current was employed, chiefly on the neck—the so-called galvanisation of the sympathetic nerve. The application of the direct current through the affected side of the head was seldom employed, and this treatment is scarcely ever of any use.[1] If the sufferers had sufficient patience the constant current was employed for at least three weeks before I gave up the hope of its being of any use, for I have seen one case in which no effect was observed during the first two weeks, but in which subsequent benefit was derived. Usually a few sittings are sufficient to show whether the attacks become milder, shorter, or less frequent. In two cases no benefit whatever was derived; in two other instances the patients obtained complete relief for a year. One of these was in the habit of coming back for treatment from time to time, directly the first warning symptoms of the disease occurred. In the other case the neuralgia returned, but in a slighter degree. In one patient the good effects lasted for four months; in another for only four weeks, and then the attacks returned with all their former severity. In five instances the improvement, after from three to four weeks of treatment, was so decided, and the attacks were so much diminished in severity and frequency, that the patients declined any operation. Unfortunately, I have not been able to obtain any subsequent information about these patients.

[1] I leave it to the electrotherapeutists to continue the discussion as to what it is that is excited or allayed by the application of the constant current.

Neurotomy.

In performing subcutaneous neurotomy I never limit myself to a simple division, but I carry the knife through the nerve in several places close to each other. In this way the nerve is cut into pieces over an extent of about half a centimètre, and rapid regeneration is obviated. I usually perform the operation subcutaneously, but sometimes make an incision about two centimètres long exactly over the portion of the nerve I wish to cut through. In three cases I divided the supraorbital close to the upper margin of the orbit before the nerve enters the notch. In none of these cases did any benefit result, although the division of the nerve was proved beyond a doubt, by the anæsthesia of the portion of the skin that it supplied.

In dividing the infraorbital nerve, I usually insert a fine neurotome into the canal and turn it round, so that the nerve is destroyed for at least the length of a centimètre. Care should be taken not to break the knife, as happened to me once in a subcutaneous operation of this nature. I had to make an incision through the skin in order to extract the broken piece. I have performed this operation on seven occasions, three times entirely without success, although the side of the lip supplied by the nerve was deprived of sensation. In three cases the cure lasted only four months, and in one other for three months. In two instances the pains recurred with less severity, and in two were as bad as before.

Neurectomy.

In performing neurectomy of the infraorbital nerve I make a horizontal incision, about three and a half centimètres long, along the lower edge of the orbit; then with a raspatory I push back the periosteum as far back as the entrance of the nerve into the canal; then with a strong resection knife I cut through the nerve in this situation together with the upper wall of the antrum. Next, with two pairs of dissecting forceps, I separate the nerve from the lower border of the orbit, beginning at the back part. The nerve is then drawn out of the canal, and is cut through where it forms its fan-like expansion. A small drainage-tube is left in for a couple of

days; the wound usually heals rapidly by first intention, and the mark of the operation is scarcely visible after a short time. This proceeding I have adopted in six cases. Two were entirely successful; in two others the attacks had completely ceased when the patients were discharged, and no subsequent information could be obtained about them. In one instance the attacks were entirely absent for six months, and then returned with their former severity. In one case, after complete relief for three months, the attacks recurred with diminished intensity.

In one patient, after a futile resection of the infraorbital nerve, I cut away the painful parts of the alveolar process. The attacks ceased completely for seven months, and then came back as before. Much the same result followed extirpation of the stump of the second nerve at the foramen rotundum and neurectomy of the mental nerve.

In five cases I performed neurectomy of the mandibular nerve, *i. e.* a portion of the nerve, about one centimètre in length, was resected above the dental canal. This method has been described by Dr. Menzel in the 'Arch. f. kl. Chirurgie,' Bd. xiii, p. 668. The operation is not without risk, but it seems to be beneficial. In one case the patient was completely free from his attacks for a year; then mild recurrence took place, which, however, did not seriously inconvenience him.

One of the patients operated on died from diphtheritic inflammation of the wound and ostitis of the lower jaw, with septic poisoning. This seems to have been caused by the retained secretions in the wound, which became closed by swelling of the periosteum of the gum. Profiting by the experience of this case, I always subsequently left a small drainage tube in the wound.

After this operation there is at times some difficulty in opening the mouth for the first two or three months, but later on this completely disappears. I must not forget to mention that I saw a patient in whom the attacks had ceased for five years after a neurectomy of the mandibular nerve, performed by Schuh. Severe recurrence then followed, on which the constant current had only for a short time any beneficial effect.

To sum up, I have performed neuro-discission in seven cases, neurectomy in fifteen; in two I have partially resected the upper jaw, and in one instance the carotid artery was ligatured. Taking all the results together they seem certainly unfavourable. It may be

thought irrational to undertake any operation in order to relieve a disease of which we do not understand the cause, yet, further, where we cannot predict with any certainty whether any benefit will follow from the operation, and how long, if improvement does so follow, it is likely to last. Nevertheless I am convinced that these operations, which are seldom dangerous, cannot be avoided in the case of these tortured patients. Often the effect of such operation is like that of tracheotomy on those who are in a state of suffocatation. Free these unfortunate creatures from the anxious strain of expecting at any moment this terrible pain, and their delight will soon show itself. They are full of gratitude for the operation, and even if recurrence does take place they do not reproach the surgeon, as so many patients do when tumours recur; on the contrary, they almost invariably beg for further operation. I have often had occasion to insist with gentle earnestness on tentative treatment with the constant current. Many of the patients lost patience only too soon when it was tried; they come back to the surgeon after all remedies have been exhausted, with the rooted conviction that from division of the nerve alone can they obtain relief from their agonising pain.

As a rule, I am much more opposed to operation than the patients are, for I recognise in operation only a last resource, and if this remedy can give no help there is nothing further to be done. Once, and once only, have I met with a patient who was so terrified at the thought of an operation that he could not persuade himself to have anything done. This was a man fifty years of age, but he looked as if he were seventy; for fifteen years he had suffered from neuralgia of the mandibular nerve. I can see him now before me, emaciated to a skeleton, with a rigid, staring expression, with the saliva constantly dribbling from his open mouth, with white, neglected beard, and long unkempt hair. Morphia injections alone gave him brief intervals of relief, and these to be of any use had to be given in ever-increasing doses. Such was the end of a case described above; towards the end he was taking eighteen times a day twelve grains of morphia, until at last even the herculean frame of this man succumbed. Only those who have had no experience of the torments suffered by these unfortunates could condemn these patients to what is little better than a long-protracted suicide. Are we, by discarding operations for the division of nerves, to throw on one side a remedy which is not in itself attended by any serious risk? Are we to renounce a remedy

which can give these most unfortunate of all sufferers a prospect of recovering, if only to some slight extent, some general feeling of health for the time which they have still to live? Let us as surgeons imagine ourselves confronted by a patient for whom this treatment is absolutely the only resource. Can we avert our eyes from the sufferer's glance when he begs, if only for "some relief, some easement, some hope?" There can be no doubt as to the answer we should return to such an entreaty. There can be no doubt as to our course of action.

Section C.—Phosphorus Periostitis and Necrosis.

In the year 1860 there were no less than twenty lucifer-match factories in Zürich, and we had therefore abundant opportunity for studying the disease of the jaws arising from phosphorus. During 1860 and 1861 the frequency of the disease struck me very much. Out of twenty-three cases which came under my notice sixteen occurred during these two years. Between 1861-66 I only met with seven, and three of these patients did not come from the Canton Zürich. This diminution of the disease was so striking that there could be no doubt that it depended upon the improved sanitary regulations enforced by the police. Improvements were effected in the internal arrangements of the manufactories, and the district medical officer was ordered to inspect all the operatives at least once a month. His duty was to enforce their absence from the manufactory on the first occurrence of pain about the jaws, or if they showed any symptoms of illness. As to the exact nature of the process by which the fumes of phosphorus affect the periosteum of the jaws, no positive opinion can be given. The supposition that the phosphorus in some form or other is taken up into the blood, and then exerts a specific irritating influence on the jaws, has hitherto neither been proved nor refuted; the same is true of the hypothesis that the phosphoric fumes exert a directly injurious influence on the gums, particularly when the teeth are carious or the alveoli diseased. It is evident that phosphorus periostitis may occur when the teeth are not diseased, for in some of my patients all the teeth were perfectly sound; this I have myself observed, though only in a few instances. A single case, however, would be

sufficient to refute the assertion that disease of the teeth is always found in connection with this malady.

My tables show that of twenty-six cases the upper jaw was affected in eight instances, and the lower jaw in eighteen, and that the ages of the patients varied from 18 to 33.[1] There was no material difference between the frequency of the malady in the two sexes. Most of these persons begin work in the manufactories as children; the length of time for which they had been employed bore no proportion to the severity of the disease, nor did it influence its occurrence.

It is well known that a person previously healthy may work for many years in a lucifer manufactory without becoming affected, provided the rooms be well ventilated and proper precautions taken; on the other hand, a short period of the work in a badly-ventilated apartment, is sufficient to induce the disease; many accidental circumstances have, however, to be taken into account. With regard to the progress of the complaint, I find it noted that only subacute or chronic cases came before me; I saw none of the very acute forms with foul suppuration and infective fever. The pain varies very much; it is never completely absent, but instances occurred where it was sufficient to cause insomnia during many weeks. The disease was usually associated with slow remittent fever, great emaciation, and weakness.

In January, 1866, a strong peasant girl came under my care, from the Canton Unterwald, in whom the disease was in such an early stage that the periostitis could be treated as such. In this patient the teeth were all perfectly sound up to the first left molar; this had been healthy too, but the patient had allowed a country practitioner to extract it as she fancied that the pain was especially severe at this spot. At the bottom of the socket the bone was bare and suppurating. Over the whole of the lower jaw, the gum and periosteum were considerably swollen and painful; at the right border of the jaw lay a small abscess in the subcutaneous cellular tissue. (I may here remark that abscesses forming externally, in connection with the jaw, are by no means always directly set up

[1] The history of twenty-three cases of this disease, arranged in a tabular form, will be found in Billroth's 'Chir. Klinik,' 1860-67, p. 83 *et seq.* Three other cases are recorded in the 'Chir. Klinik,' for 1868. Most of these are referred to in an essay by Dr. G. Haltenhof, entitled 'De la périostite et de la Nécrose Phosphorique,' Zürich, 1865.

by diseased bone or periosteum; frequently they originate in the loose layer of cellular tissue lying on the newly-formed layers of bone, without exposing the latter; cloacæ and sinuses may form, as in necrosis, but they are less frequent about the jaws than elsewhere, inasmuch as the pus originating between the old and the new bone breaks into the mouth.) I treated this patient for two months with iodine inunctions, and iodide of potassium internally. The swelling of the periosteum and gums completely disappeared under this treatment. I expected some slight exfoliation from the exposed alveoli, a process that I should like to have seen completed, but which did not occur while the patient was under my care. She felt herself so well and free from pain that she would no longer stay in the hospital. I heard, three months after her discharge, that she continued perfectly well.

In cases where the periostitis ran a chronic course, and was attended by slight pain, the patients always came far too late to the hospital. At the outset they paid but little attention to their condition, and felt bound to earn their livelihood by working on in the manufactory. I have known these patients, when for a time, want of room prevented their admission into the hospital, go back again, in spite of all advice to the contrary, to the manufactory with suppuration of the jaws. The truth of the saying that "necessity knows no laws" is the simple explanation of this lack of common sense.

The lower jaw is far more frequently affected than the upper; this is shown in my small number of cases. As regards the duration of the disease, many circumstances have to be taken into account. Among my cases the shortest period was six months, the longest two and a half years.

In the matter of treatment I am sure that, if the patient be removed from the factory immediately on the occurrence of pain in the lower jaw, the mouth well washed out, and favourable dietetic conditions secured, the process will stop of itself. Perhaps in chronic cases, and in those which are subacute at the outset, iodides or mercury may assist in arresting the disease. The loss of many jaws, nay, of many lives, may certainly be obviated by timely treatment. Before going further into the treatment, I must say a word upon the anatomical conditions, for the expression phosphorus "necrosis" has led to much misunderstanding. It must not be supposed that from the first a circumscribed portion of the jaw becomes rapidly necrosed, as in noma or gangrene of the mouth

after typhus. The disease at the commencement comparatively seldom takes the form of suppurative periostitis and osteo-myelitis. At the outset the periosteum and gum thicken; young bone is, in consequence, very rapidly produced from the germ tissue, partly developing on the surface of the bone, partly from the layer of periosteum immediately in connection with it. In the great majority of cases phosphorus periostitis is, like other forms of chronic periostitis, primarily an osteo-plastic process. Ulceration and suppuration occur at a later stage of the disease. The substance poured out to form the cast of new bone on the superficial surface of the diseased jaw, begins to melt away; in part it forms granulation tissue, in part it breaks down into pus; thus, the shell of bone becomes entirely detached from the jaw, and new formation and thickening only take place on its outer surface. The steps of the process are similar to those observed in normal growth of bone, viz. apposition of the periosteum, and breaking down of the first-formed inner layers into the marrow (in this instance into granulation material and eventually into pus). If the process went on with perfect regularity, the newly-formed invaginating bone would become continually thicker and thicker, and eventually separate itself entirely from the jaw. Further, by suppuration of the vessels passing from the periosteum into the bone, the jaw would be cut off from the circulation, and thrown off *in toto* as a sequestrum. Naturally the bony investment would be incomplete, as none would be formed where the teeth are implanted. But the changes by no means go on with such uniformity; the ulcerative process of the superficial surface of the jaw progresses with great irregularity. The invaginating bone is broken through by caries and ulceration from within. As long as circulation goes on in the medulla of the jaw central softening changes take place; granulation masses, forming bone and then breaking down, originate in the alveoli and around the sockets of the teeth; the flow of blood to the jaw from without is checked here and there. By collateral circulation the medulla is supplied, so that the outer part of the jaw dies, while the inner part is kept alive; the investing layers of bone are often destroyed in their growth; here and there the new bone substance melts away by ulceration, or partial necrosis takes place; abscesses form around the jaw, and at times acute inflammation of the mucous membrane of the mouth or tongue is added, thus further interfering with the circulation. The process fluctuates between osteo-plastic or ulcerative

ostitis and necrosis. Such changes are by no means confined to this disease alone; many affections of the periosteum, of the bones and of the joints run their course, oscillating in the same way between new formation and degeneration, between plastic production and ulcerative and necrotic breaking down.

If the local process be allowed to progress without interference, the results will vary exceedingly. If all goes on favourably, from time to time single necrosed portions may be removed, and an invaginating layer of bone will be left to serve instead of the original bone. In my judgment a purely expectant treatment does not yield the best results. I saw one case where, under such treatment, half the jaw came away through the cheek as a sequestrum, and the new formation was ultimately very inconsiderable, being in great part destroyed by ulceration and suppuration; moreover, very ugly scars were left on the cheek. It will usually be observed that the disease commences on one side, either on the lower or upper jaw. If the patients remain under observation long enough, the process may be seen to gradually extend over half the jaw, or may even affect the entire bone. The extension either progresses by occasional acute attacks, or spreads gradually; no antiphlogistic treatment will either hinder or check it. Cases like these lead one naturally to suppose that if the part first affected had been promptly removed the entire half of the jaw need not have been lost. Acting on this idea in three cases, I resected the diseased portion of the jaw in its continuity; I made my incision externally, broke away the osteophytic layers, and preserved the periosteum. In one case only, however, was the wished-for success obtained, that is to say, the process stopped, and the continuity of the jaw was completely restored by abundant bone formation. In other cases I forcibly extracted the sequestrum through the mouth, which may often be done without breaking the newly-formed bone; on the whole, the results were not bad. The proper opportunity for forcible extraction of the diseased and half necrosed jaw is when the separation of the invaginated bone is sufficiently far advanced and as thick as possible. If the pain, however, be very severe, and the patient much reduced, I remove the bone at an earlier period. It is very interesting to see how rapidly, at times, the shell of bone left becomes a solid mass. In two very successful cases of recovery after total necrosis of the lower jaw, a new bone was formed resembling that of old edentulous persons.

In phosphorus necrosis of the upper jaw it has been asserted that no replacement of the bone takes place. This is only partly correct; naturally the alveolar process of the upper is less capable of restoration than that of the lower jaw. It must be remembered that after loss of the body of the upper jaw, no proper antrum will be re-formed, and the walls of the upper jaw will collapse. The palatine process is completed from above and below, but the bone will be greatly retracted; nothing is gained after extraction of the palatine process, by uniting the muco-periosteal investment of the hard palate to the upper lip. The zygomatic, nasal and orbital processes, may be completely regenerated. In one of my patients, who was supplied with an artificial alveolar process fitted with teeth, scarcely anything wrong would have been noticed, nor would anybody have supposed from seeing or speaking with the man, that both the upper jaws and both the zygomatic bones had been entirely lost.

With regard to the danger to life of phosphorus periostitis, it is known that a few, especially among the young, die from its results, either from tuberculosis of the lungs, abscess of the brain, or marasmus. Two of my patients died of tuberculosis of the lungs during the inflammatory stage of the disease of the jaw. The two diseases are so far connected, that individuals predisposed to tuberculosis of the lungs, are liable to this disease at an earlier period and in a more severe form, if their strength is exhausted by a complaint involving suppuration, ulceration and fever.

A word as to the durability of the new periosteal bone. That a certain amount of atrophy and superficial destruction of the newly-formed bone takes place, cannot be denied, but neither in this case, nor in necroses elsewhere, does it proceed to such an extent as materially to interfere with the appearance. I may mention in support of this statement, that I saw one of my patients who had suffered from total necrosis of the jaw, six years after his recovery. The new bone was smooth on the outer and inner surface but felt compact; it was slightly lower and smaller, however, than when he left the hospital. It is very interesting to observe, though the fact is unexplained, how the callus about a fracture, like invaginating bone, disappears only to a certain extent, and as nearly as possible reproduces the original shape of the bone.[1]

[1] Some highly suggestive remarks on this point will be found in Paget's 'Lectures on Surgical Pathology,' Lecture vii.—[Ed.]

Section D.—Plastic Surgery of the Face, Nose, and Mouth.

Remarks on deviation of the septum narium. Case of salivary fistula. Treatment of hare-lip. Treatment of cleft palate. Deformities treated by plastic operations. Cicatricial contractions of mouth—Cases. Case of ectropium and corneitis. Rhinoplastic operations. Case of repeated operations.

Deviation of the septum narium.

This condition is usually congenital, and is accompanied by a peculiar typical obliquity of the nose. Sometimes, however, a similar condition results from blows on the nose, causing fracture or bending of the septum. Only three of these cases were treated inside the hospital, but many came under notice as out-patients and in private practice. Formerly, I used to endeavour to correct the deviation of the septum and to keep it straight by the insertion of small wooden or ivory wedges into the nasal cavities, after separating the cartilaginous and bony part of the septum. This process is long and tedious, and, moreover, it completely failed in a patient of mine in Zürich; nothing material was gained after six weeks of torment. Since then, therefore, I have abandoned this treatment. If the blocking of the nasal cavity, owing to the bent septum, is very troublesome, I make a hole large enough to admit a pea through the bent part, so that the patients at least have the subjective sensation of breathing through both nostrils; with this condition of things they were always very well satisfied. This little operation requires some delicacy. Were not the cases so rare, it would be worth while to have a kind of nippers constructed, something like those used by railway guards to clip the tickets. I have usually managed with the aid of a two-edged knife and a pair of curved scissors, but the effect is not always quite satisfactory. The opening should be made rather high up, so that it cannot be seen. At the upper part, however, the septum is so strong that it is not easily cut through. In young persons the opening ought to be at least large enough to admit a pea, otherwise it is apt to be-

come smaller and the operation may require to be repeated. The deviation of the septum and its effect in impeding respiration through the nose, is imperfectly understood by many surgeons, like the partial enlargements of the inferior turbinated bone. These patients were nearly always sent to me with the diagnosis of nasal polypus.

Salivary fistula.

One case came under my care in which, five months previously, an abscess had originated in the neighbourhood of Stenon's duct without known cause. A fortnight after its first appearance the abscess was opened. A fine fistulous opening was left, from which a considerable amount of saliva continually escaped, especially after eating. The probe passed through the opening into the duct close to its exit from the gland. Inasmuch as the proximal end was too short to allow of its being detached and turned into the mouth, I dissected out the duct together with the fistula, and placed close above it a strong silk ligature in such a way that I was able to tie the ends of the thread firmly in the mouth. Then I refreshed the two edges of the skin wound and brought them together over the ligature. My hope was, that the ligature would soon cut its way through, that the skin would heal by first intention, and that the saliva would pass into the mouth through the fistula, which was now turned in that direction. This did not succeed, however, so directly as I wished; the parotid swelled up considerably for the first few days. The loop of the ligature was removed from the mouth after a week. In the meantime the skin sutures had been removed; some suppuration took place at their situation; pus could also be pressed out from the parotid at the wound, and some saliva also flowed externally. The part was cauterised and pressure applied. Finally the wound in the cheek closed, four weeks after the operation, and no more saliva escaped externally. I cannot say positively whether this result was due to partial suppuration and atrophy of the gland, or owing to the altered situation of the fistula, which had been directed inwards.

Hare-lip.

Unless the parents urgently demand an operation as early as possible, I generally prefer to operate on children when they are more than one year old. I always advise this in strong children with complicated hare-lips, especially when the inter-maxillary bones are displaced and the hare-lip is double. In a few cases that I have kept under observation for some time after operation, the fissure of the alveolar process closed after a few months, when the operation was performed at the second year.

I have been particularly satisfied with the results of operation, as far as appearance is concerned, on children at rather later periods of life and in adults. Operations on little children do not always succeed as well as could be wished, on account of the diminutive size and softness of the parts. The flaps of the lips cannot always be adapted exactly as desired, and even if this be satisfactorily accomplished, the result does not in every case quite come up to expectation, so that some few years after further slight proceedings become desirable in order to improve the appearance. At later periods of life the thick edges of the lip can be much better refreshed, trimmed, apposed, and united, just as seems at the time to be desirable, and there need be no fear as to the result. In order to obtain the best possible result, when there is no fissure of the alveolar process, the operation should be deferred till the patients are from three to six years old, but the friends and relations of the child will seldom agree to this delay. Operations on quite little children sometimes succeeded so completely that I was not able to improve matters later on. Still, I decline to give any absolute guarantee with regard to the result in such cases. Here, in Vienna, children of considerable age and adults very frequently come to the clinic with hare-lip which has not been operated upon. This, doubtless is explained by the fact that these individuals, for the most part, come from the outlying districts where there are but few surgeons.

Staphyloraphy and Urano-plastic Operations for Congenital Malformations.

Although, according to the experience of Rose, better results can be obtained when the children are operated on under the influence of an anæsthetic, and with the head hanging down, yet the functional results have hitherto not encouraged me to perform these operations on children to any great extent. However, the matter is by no manner of means yet settled.[1] I had two fatal cases, in children of two weeks and two months old respectively. The operation should, therefore, be delayed until the children are a year old and in good health. With regard to the functional success of

[1] *Vide* a paper by Mr. Thomas Smith in the 'Med.-Chir. Trans.,' vol. li. To Mr. Smith is due the credit, at any rate in this country, of showing that the operation could be performed at an early age.—[Ed.]

operations undertaken at an early age, I may mention the case of a child who was treated successfully when one year old. Four years afterwards he still spoke with rather a guttural tone; but an instance such as this by no means settles this point, for we do not know whether later, say when this child was fifteen years of age, his speech would not have been better than if he had been operated on at the age of fourteen. Careful comparisons require to be made on the subject. The further question also arises, whether after successful operations for hare-lip and staphyloraphy during the first year of life, the fissure in the hard palate may not close spontaneously later on. Now, in my patient, the fissure had in no degree diminished after the lapse of a year, so that this case proves nothing; furthermore, if this child had been provided with an obturator early, and had from the first practised and exercised the palatal muscles after the velum had been united by operation, his speech might have been better than in a patient operated on later in life. Although I value very highly the conspicuous success which Süersen[1] has obtained by the invention of his obturator, yet what I mean is, that we should not desist from attempts to obtain an equally good result by operation. The new methods of operating devised by Passavant and Schönborn deserve to have every attention paid to them, and require still further development.

In the case of a woman in whom staphyloraphy had previously been performed by another surgeon, I did an urano-plastic operation. The patient was exceedingly troublesome and restless. On the third day violent vomiting occurred after a surfeit of milk and cherries, and all the sutures gave way. The operation was, of course, unsuccessful.

In six patients who were cured by operation, and in one who was provided with an obturator after union of the velum, speech was improved, but it was still not so good as in the case of patients operated on for simple fissure of the arch of the palate. The patients were well pleased that they required no longer to wear an obturator, and that their food and drink did not so readily pass up into the nose, but were disappointed with regard to the improvement of articulation. I cannot say whether ossification of the newly-formed palate followed later on.

It appears to me, from what I have learned after minute observation on these cases, that the soft palate is united to the posterior

[1] 'Lehrbuch d. Zahnheilkunde,' Leipzig, 1877.

wall of the pharynx by a kind of sphincter apparatus, which lies above the union of the soft to the hard palate, and may be regarded as the uppermost portion of the constrictor pharyngis.

This sphincter is always defective anteriorly in total fissure of the velum, and in those cases where the fissure involves the hard as well as the soft palate. The union of the velum palati and the muco-periosteal lining of the palate does not lead to the functional development of this muscle. This appears to me to explain why, after operations on adults, speech is not improved. I noticed this fact after my first operation for cleft of the hard palate, and Simon, Passavant, Süersen, and others have arrived at the same conclusions. Süersen describes the benefits of using an obturator in such glowing terms that, according to him, we ought almost to discard operations for congenital fissures of the palate.

Deformities Treated by Plastic Operations.

I met with a few cases of cicatricial contraction of the mouth, resulting from periosteal abscess in the neighbourhood of the back part of the lower jaw.

In most of these the cicatricial bands were only on one side, and situated far back, so that the mouth could either not be opened at all, or at the best, only to a slight extent. Under the influence of an anæsthetic, the jaws were forced apart by Heister's speculum and then the bands being cut through, the blades of the speculum were separated to the widest possible extent. After treatment for several weeks with the introduction of wooden wedges, the function of the jaw was so far restored that in some of the cases the mouth could be opened 5 centimètres. I cannot say how long this good effect lasted: at any rate none of the patients came back to me.

In another case the contraction was the result of destruction of the lip by noma; another followed after the excision of a cancer. In both of these I replaced the lower lip and the angles of the mouth on both sides, by flaps taken from the cheeks and chin. The mouth subsequently became contracted, partly owing to the contraction of the cicatrices, and partly from the adhesions of the lip to the lower surface of the jaw. In a third case the opening of the mouth was so narrowed by a rhinoscleroma,[1] which extended over the lips, that it would only just admit the end of a pencil. In

[1] See Mikulicz, "Ueber das Rhinosclerom," 'Arch. f. Klin. Chir.,' Bd. xx, p. 485.

all three cases incisions were made on either side, so as to widen the mouth; the mucous membrane was then united with the cheek, so as to cover over the raw edges, and the patients eventually were able to open their mouths to a fair extent.

F. S—, æt. 43, had had for four years disease of the mouth, in consequence of which the inner surface of the left cheek had become firmly united to the upper and lower jaws. The patient was scarcely able to separate his teeth, and could only take fluid food. He had previously been treated by the introduction of wooden wedges and incisions through the cicatrices; neither of these proceedings had, however, done him any good. As it was found impossible to open the mouth any wider by Heister's speculum, a portion of the jaw, a third of an inch in breadth, corresponding to the left lower canine tooth, was cut out, in order to form a pseudarthrosis. The parts healed up well, but the resulting cicatrix was so firm that when the patient was discharged after two months' treatment, the incisor teeth could only be separated apart to the extent of a quarter of an inch. The patient was a semi-idiotic individual, and could not be induced to use for himself any mechanical devices for dilating the mouth; still less would he submit to a more extensive resection, which was thought necessary in order to enable him to open his mouth wider. The condition, therefore, of the patient on his discharge was highly unsatisfactory. Two years later he came back to the hospital on account of a whitlow. The final result of the operation above described was then seen to be very satisfactory. The patient could open his mouth wide enough to admit the thumb. The right side of the jaw, in front of the resected part, was displaced rather to the left, while the left half of the jaw had somewhat atrophied. The movement in the pseudarthrosis was not extensive, but was sufficient to allow him to masticate solid food.

A. S—, æt. 5. For about a year the extent to which she could open her mouth had been constantly diminishing. When admitted she could not separate the teeth from each other more than two lines. The parents were unable to give any reason for this condition. On examination, the anterior border of the right masseter muscle was felt to be very tense. This was cut through, and she was then treated by the introduction of wooden wedges. Rapid and complete recovery followed.

Ectropium.

J. H—, æt. 14, was admitted with complete ectropium of the upper lid, which had resulted from ulceration of the eyelids, and caries of the lower surface of the nasal bones. A sound could be passed right under the nasal bones from one side to the other. The conjunctiva of the lids was turned upwards and much swollen and red. Both corneæ were almost entirely devoid of covering and somewhat infiltrated, and the ocular conjunctiva highly vascular. When admitted, ulceration of the right cornea existed, which, in spite of Professor Arlt's careful treatment, could not be checked, and prolapse of the iris followed. Finally, the inflammation ceased, but the vision of the right eye

was reduced to quantitative perception of light. When the patient was admitted, I doubted whether I ought not to have at once performed a blepharoplastic operation; this seemed, however, risky, considering the inflamed condition of the eye. On the left eye, I performed a blepharoplastic operation, borrowing the flaps from the temporal region. The result was most unexpectedly favourable not only with regard to the covering of the cornea, but in appearance. The infiltration of the cornea, together with the conjunctivitis, disappeared very shortly after the operation. The vision of the left eye was not only preserved by the blepharoplastic proceeding, but improved by the gradual and complete clearing of the cornea. An attack of erysipelas, which reduced the patient very much, prevented me from performing a similar operation on the right eye.

Rhinoplastic Operations.

Three patients came under my care at the Zürich Hospital, in whom there was complete or nearly complete destruction of the nose, the result either of caries of the bony framework of the nose, or of syphilitic ulceration. In all three cases, rhinoplastic operations from the forehead were performed with successful results. One of these patients died of albuminuria a few months after operation. My attempts to utilise, as much as possible, the remnants of the nose, convince me, as it has also other experienced operators, that such endeavours are not advisable. The remnants of the shrunken cartilages of the nose, in spite of all possible padding with the other soft parts, invariably contract again during cicatrization. The alæ of the nose, and the process of the septum alone, cannot be too carefully preserved. In three rhinoplastic cases I utilised the periosteum of the frontal bone for the new nose, but in none was there any new osseous formation. The wounds on the forehead healed more slowly and remained longer adherent to the bone than in the older and more usual procedure. Two of the cases where I performed total rhinoplastic operations were associated with partial defect of the upper lip. I first performed a cheiloplastic, and then immediately proceeded to the rhinoplastic operation. I cannot, however, recommend this proceeding; healing by first intention is endangered by the numerous sutures which meet together at the upper lip. In both the cases the septum healed but partially, and had to be completed by a later operation. It is always better first to form the upper lip; when this has completely healed, the rhinoplastic part of the operation may be undertaken.

Of fourteen complete and nearly complete rhinoplastic operations (cases of cancer not included) performed between the years 1860

and 1876, the lesion was, in twelve cases, of syphilitic origin; in one it was due to lupus, and in one to a gunshot wound.

In all these cases I formed the nose from the forehead; gangrene never followed, not even partial destruction of the septum or alæ of the nose. So far as I can remember this was also the case after rhinoplastic operations performed after the removal of cancer. In one case only the flaps, which had been formed from very thin skin taken from the forehead, shrank up so rapidly that I had subsequently to perform a new rhinoplastic operation, borrowing two flaps from the cheek. One patient died of pyæmia, which commenced with suppuration in the frontal bone, and ran on to meningitis, thrombosis, and abscesses on the lungs. In another case diphtheritic inflammation attacked the wound in the forehead, but it did not last long. Undoubtedly, the disease arose from some transplanted skin, which had been taken from a leg amputated on account of caries. My experience of transplantation has not been favourable, and I have completely given up the method in wounds of the face. The pieces of skin transplanted do not usually last, and when they do, they give a sort of mosaic appearance to the scar, and a red cicatricial edge forms around the white transplanted portion of skin. Whether this edge disappears in the course of years I cannot say. I once saw a cicatrix where the skin had been taken from the hand, in which such a mark was very evident several months after the operation. The question not infrequently arises after the removal of cancers extending from the nose over the cheeks, as to whether the gap in the cheek should be covered in by flaps taken from the forehead. The gap might also be closed, by a sliding plastic operation or by flaps, so that only the natural shape of the apertura pyriformis is left. My experience leads me to a decided preference for the latter method, for this gives the best appearance. Directly after the operation I introduce a thick gutta-percha tube into the nasal cavity, as far up as the infundibulum, and insert some charpie, so as to keep the apex of the nose and the alæ in good position from the first. This is better than the old plan of plugging up the nose with charpie, for the patients are able at once to breathe through the newly-formed nose. For the first few days the tubes are syringed out several times in the twenty-four hours; after the fourth day they are changed; after this they are changed daily. I usually employ the gutta-percha tubes throughout, and do not introduce any lead or other rigid tubes. If

v. Langenbeck's method be adopted, of folding in the septum and both alæ of the nose, and preserving the mucous membrane of the lower part of the nasal passage, there is no danger of the nasal cavities closing up at a later period. The amount of subsequent narrowing depends materially on the patients. The tubes ought to be introduced every night, for at least a year. By doubling in the septum and alæ, the lower part of the nose is certainly made rather thick, and will remain so for about a year, but as the newly-formed organs always become rather soft, thin, and smaller, after some time, the prominence of the nose will be so materially diminished that its appearance will be very ugly, unless the whole of the lower part be made as thick as possible at first. I have no experience of rhinoplastic operations on children; I have never ventured to perform complete rhinoplastic in such cases, for fear that the newly-formed noses might not grow and keep pace with the development of the face. Possibly I am prejudiced; any positive information on this point would be very desirable. We are often implored by the parents of such unfortunate children to do something in order to improve the deformity.

Repeated rhinoplastic operations from the arm, forehead and cheek.

J. R—, æt. 30. The nose in this patient had been destroyed by syphilitic disease. In March, 1870, a complete rhinoplastic was performed by Dr. Salzer from the left upper arm. The result, which was at first very successful was marred by sloughing of the septum and a portion of both alæ of the nose; subsequently the remainder shrivelled up completely. In November, 1870, I performed a complete rhinoplastic from the forehead. The result at the outset was again satisfactory, but the flap from the forehead and the septum shrank up to such an extent that the apex of the nose projected very much upwards and the prominence of the organ was insufficient. On the 2nd December, therefore, I performed a fresh operation, with a view to renew the end of the nose. Unfortunately, the nourishment of the upper part of the septum, when separated from its bridge and the alæ of the nose, was inadequate, and the greater part of the end of the nose and a portion of the ala sloughed. The defects which now existed on both sides were filled up by two small flaps from the cheeks. The eventual result was tolerably satisfactory, though not so good as in a well-formed rhinoplastic from the forehead. The cicatrices on the cheeks were less disfiguring than I had expected; I had never previously performed or seen a rhinoplastic operation where the flap was taken from the cheek. In the course of some months, the flaps which I had transplanted became so shortened that the projection of the nose, which at first was very good, became ultimately as bad as before. Having had previous experience on this patient, I did not venture at once to proceed to any further plastic opera-

tion. By transplanting fresh flaps and causing the end of the nose to sink back into better position, the shape of the organ could have been materially improved, but I counselled the man, in case he wished for any further operative proceedings, to come back in a year's time. No further record of the case can be found.

Section E.—Non-malignant Tumours.

Cases :—Pigmentation of face. Horny cutaneous growths. Arterio-venous angioma of nose. Ditto of forehead and eyelids, treated by acupuncture. Pulsating tumour of head. Treatment of angioma cavernosum. Case of molluscum lipomatosum; repeated operations. Large neuroma plexiforme. Case of neuro-fibroma of temporal region and orbit. Non-malignant cylindroma of orbit; removal; recovery. Echinococcus of orbit. Fibroma of the cheek. Fibroma of parotid—Cases. Distension of the antrum; remarks. Note on tumours of the jaw. Case of huge fibroma of lower jaw. Note on polypus nasi. Naso-pharyngeal polypus—Cases. Note on ranula. Congenital papilloma of tongue. Sebaceous cyst of tongue.

Pigmentation of face.

A girl, æt. 8, came under treatment with the following history :—Six years previously some pigmentation, brownish yellow in some places, black in others, first appeared on the skin, near the eyes. It occurred in the form of little spots, varying in size from a pin's head to a lentil. Between the spots the skin was tolerably pale, so that she presented a completely piebald appearance. The pigmentation extended over the whole body. For some months she had suffered from intolerance of light. In the substance of the cutis of the cheek and the alæ of the nose were several soft, prominent, roundish nodules, varying in size from a lentil to a pigeon's egg. The patient was transferred to the department for skin diseases.

Horny cutaneous growths.

One of these, situated on the left upper eyelid, was half an inch long and about two lines thick. The patient was a woman fifty-three years of age, and the projection had been growing for many months. The other was on the left lower eyelid in a man æt. 33. It had been growing for three months and was 2 centimètres long, ½ a centimètre thick, and somewhat spiral in form. Both were removed.

Arterio-venous angioma.

Case.—E. J—, æt. 35. Twenty years previously she had had a fall and struck her nose. Some little time after a pulsating swelling formed, which

gradually increased to the size and appearance shown in Pl. I, fig. 2. The tumour, which was very compressible, was composed of strongly pulsating arteries and highly dilated veins. The patient would not allow any operative treatment.

Racemose arterio-venous angioma.

J. S—, æt. 17. At birth a violet coloured mole, the size of a pea was observed near the glabella; when he was twelve years old it began gradually to increase. On admission, an angioma was seen, formed of small arteries and veins, which extended over the central portion of the forehead, from the edge of the hairy scalp down as far as the middle of the nose. On the left side, it had spread on to the cheek below the eyelid. Remembering the successful effect of acupuncture which I had previously employed in a similar case (Wien. Med. Woch. 1871, No. 42), I adopted the following method:— I first performed acupuncture with fifteen long, fine, gilt needles, which I inserted right through the base of the vascular growth. No reaction followed. A fortnight later, ten more needles were carried in a longitudinal direction beneath the base of the tumour. Twelve days after the last operation the needles, most of which were loose, were removed; very little suppuration took place from the punctures.

Several very tortuous branches of the temporal artery were then secured subcutaneously by acupressure as near as possible to the growth. Two days later distinct pulsation could still be felt in an artery which ran upwards in the left cheek. Nine days later the needles were removed. The tumour had collapsed considerably, but still pulsated strongly at the lower part. Seven more acupuncture needles were then inserted, which were removed three weeks later, as they were quite loose. The diminution in size and pulsation of the angioma did not last; in some places it remained stationary, whilst at other parts the pulsation increased. Firm pressure was then tried with sheets of gutta percha, which were laid on soft, and then hardened. No success followed this proceeding. I next excised a central portion over the forehead in such a way that the edges of skin could be united together. Healing did not follow by first intention, and when he was discharged the wound was still suppurating. Meanwhile, I had thoroughly applied the galvano-cautery to the portion of the angioma where pulsation still continued. The slight bleeding which occurred from the punctures and the wounds from time to time was always easily controlled. The patient was now discharged temporarily, that we might see the effect of the cicatricial contraction. The skin, corresponding to the extensive region that had been operated on, though no longer raised, was very red in colour; distinct pulsation was still perceptible at the borders. A year later the patient returned to the hospital; the cicatrix was but slightly raised, and was in some parts of a light blue colour, at others of an arterial red. At many points pulsation was perceptible. I employed galvano-caustic puncture extensively on two occasions, and the patient was discharged with the wound still granulating. A year later he again returned; the pulsation was then still distinct at many points, but in all other respects he was in good health.

The case is still under treatment (1876).

H. K—, a strong man, æt. 27, consulted me in November, 1871. Ten years before he had noticed a pulsating swelling at the back of his head. He could assign no cause for it, but was certain that the disease was not congenital, at any rate, in the form of a pulsating growth. He had never been told whether a nævus had existed at this spot at the time of birth. Two years after the new formation had been first noticed it was injected by Nélaton with sesquichloride of iron. Slight diminution followed. This process was repeated a year later by the same surgeon, and again two years before he came to me by Péan, with much the same result. On each occasion the tumour became somewhat smaller and the pulsation diminished, but it soon reverted to the former condition. When I saw him the tumour was the size of a goose's egg, soft and elastic. Pulsation was everywhere distinct, and tolerably strong. I tried electro-puncture with the constant stream (10 cells) for eight minutes, passing the needles into the tumour. Considerable bleeding occurred from the punctures, and was controlled by pressure. The reaction was slight, and no success followed the operation. The man had not sufficient patience to wait for any further operative proceedings.

Angioma Cavernosum.

In eleven cases of angioma cavernosum, which came under observation at Vienna, the eyelids, nose, cheeks, lips, mucous membrane of the mouth, and the tongue were the parts affected. In some of the cases, one of these parts alone was the seat of the vascular growth, in others several of them were involved together; phleboliths were frequently noticed. In eight instances we learned that a small blue spot had existed from birth; these congenital cavernous angiomata increased more slowly than those of the plexiform variety. The patients operated on ranged from two years old up to twenty-nine. The increase in the size of the tumour from the time at which it was first noticed, was, in the majority of cases very gradual. In one instance, the vascular growth originated in the skin of the nose at nineteen years of age, without any known cause, and in the course of ten years had only attained moderate dimensions. Two other patients ascribed the origin very positively to a blow on the cheek. The preponderance of the female sex in all these cases of angioma is striking.

In five instances total or partial excision seemed to me the most suitable proceeding. Occasionally I employed galvano-caustic puncture, and in three cases I passed repeatedly through the tumour threads soaked in perchloride of iron. I saw lately a child, twelve

years of age, in whom v. Pitha had, six years previously, cured a cavernous angioma by repeated injections with Liquor Ferri. It was evident from the cicatrix that the growth must have extended over the left half of the nose up to the internal canthus. Unfortunately the eye had become completely amaurotic. An English surgeon informed me that a child, in whom he was treating an angioma of the cheek by the injection of Liquor Ferri, had died suddenly under his hands. Experiences such as these are sufficient to induce me to refrain from this plan of treatment in the neighbourhood of the face, head, and neck. Simple cauterisation with fuming sulphuric acid, can rarely be employed about the face to any great extent, on account of the great superficial contraction that follows. In one case, where I had destroyed a small teleangiectasis of the temporal region in this manner with complete success, the cicatrix preserved a deep, reddish-brown colour. Although the part was completely movable and the wrinkles in the skin were not interrupted on any slight movement, as for instance, in laughing, yet the red colour of the scar, which could not be completely removed by pressure, caused an unpleasant effect. Evidently there was some yellowish red pigment deposited in the cicatrix. The scar, which was only three-fourths of a centimètre in diameter, might easily have been cut out, but it disturbed the vanity of the youth too little to induce him to submit to its removal.

I have never seen a similar result follow after cauterisation; the cicatrix, after the application of fuming nitric acid, often remains thick and rather painful for a long time, but this disappears after some months, and the cicatrices eventually become as white as in other cases.

Time has strengthened the favourable impression which I formerly held with regard to the treatment by galvano-caustic puncture of diffused angiomata for which excision was unsuitable. It is very important to watch these cases closely while the sloughs are separating. At this time hæmorrhage often occurs; care must be exercised, therefore, in treating out-patients by this method. One unfortunate child died from hæmorrhage of this nature, for his neglectful parents did not send for a surgeon until the child had bled to death. In children who are carefully dressed every day in the clinic no bleeding of importance ever occurred. I think, therefore, that there is no danger in sending the little patients home after cauterisation, provided they be enjoined to come up daily to

have the part dressed. In the case of parents who do not look very closely after the lives of their children—which, among poor people, is common enough—we should always take into account a possible want of care, for the consequences of which the surgeon would be held responsible. Recently I have adapted to Paquelin's apparatus a sharp-pointed platinum cautery, which answers very well in cases of angioma. By means of this instrument we are able to dispense with the galvano-caustic apparatus, which in private practice is a great advantage. I have repeatedly employed threads soaked in perchloride of iron. As far as one can judge of the effect a few weeks after the application, the results were good. Of course the cicatrices are no better than after galvano-puncture. Suppuration usually follows on the use of the threads, thus bringing about a more decided effect.

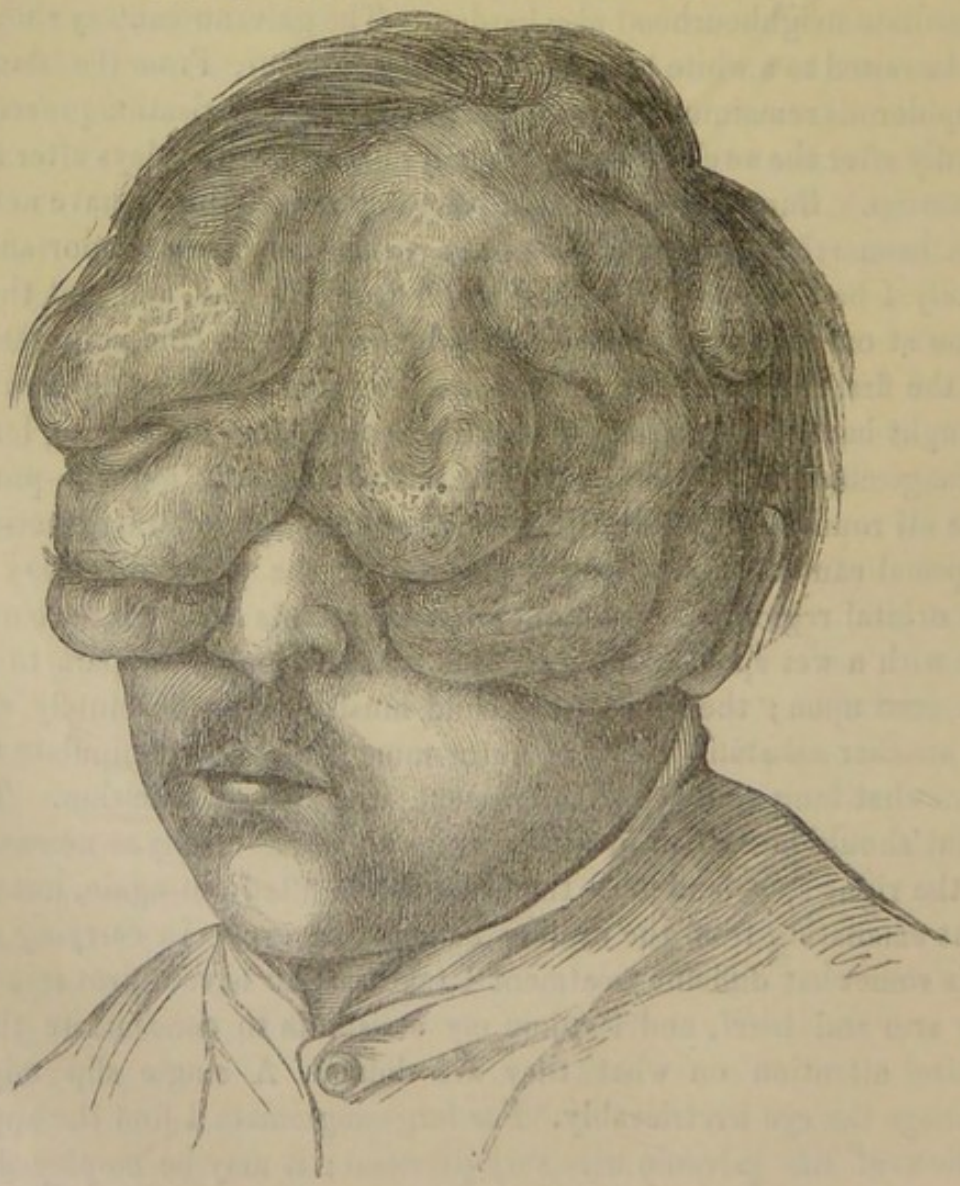
In the treatment of these angiomata, we often find that in cases which are not completely cured at the time when treatment ceases, the remainder of the growth undergoes spontaneous cure. In other cases, again, which are supposed to be completely cured, further growth takes place contrary to expectation. I should not presume to give any decided prognosis as to the permanence of a cure in any particular case.

Of six cases of plexiform angioma met with at Vienna during 1869—1870, two were cured by excision of the growth, while four were treated partly by repeated puncture with the galvano-cautery, partly by the galvanic wire. In all these cases the growth was congenital, and began shortly after birth to grow more or less quickly, in two of the cases reaching such an extent that with other methods of treatment but little could have been accomplished. The treatment with the galvano-cautery and the galvanic wire has exceeded my most sanguine expectations. *A priori* I did not promise myself much from its use, for in order to obtain a cure it seemed to me that the whole of the new vascular formation must be destroyed, and that, therefore, cicatricial contraction would be the same as after extirpation of the growth. The injection of Liquor Ferri, in cases of plexiform angioma had not impressed me favourably. I therefore adopted again the plan of destroying these superficial angiomata with fuming sulphuric acid, while moderate-sized tumours of this kind I removed with the knife. In one of my cases, however, I doubt whether any surgeon would have ventured to excise the growth; the skin of half the nose, the glabella, the whole of the lower eye-

lid, the entire cheek, and half the upper lip were affected. To remove with the knife a growth of this extent in a child is rather too formidable an idea; even if by repeated partial excisions the hæmorrhage could have been obviated, terrible disfigurement must have been left. In Zürich, I had already adopted, with success, Nussbaum's recommendation to puncture these angiomata with bundles of red-hot needles; this process, however, is very tedious, for the needles cool so rapidly that they perpetually require heating again. In cases of large angioma, therefore, the success of each individual operation is but slight, and the parents of the little patients soon lose patience. By thoroughly puncturing the tumour with the red-hot pointed galvano-cautery, taking care, however, to leave small islands untouched, not only are the vessels which are met with destroyed, but, after the loosening of the eschars, the vessels in the immediate neighbourhood also harden. The galvano-cautery should not be raised to a white heat, or bleeding will occur. From the islands of epidermis remaining between the punctures, cicatrisation proceeds rapidly after the swelling has subsided, *i.e.* eight or ten days after the operation. Suppuration is often tolerably severe, but I have never seen hæmorrhage occur later on—a matter of some importance. Lately I have repeatedly treated children in this way, and sent them home at once. I advise the parents always to apply cold compresses for the first few days, then oiled lint, and direct that the children be brought back to me when the wounds are healed. In treating large teleangiectases of the face, I generally commence by galvano-puncture all round the growth, in order to stop any peripheral extension. Especial caution is necessary in the use of the galvano-cautery in the orbital region. I make one of my assistants cover up the closed eye with a wet sponge, so as to leave exposed only the part to be operated upon; the head of the child must be kept absolutely still by another assistant. The operator must learn to manipulate the somewhat long and heavy instrument with great precision. The point should be carried in with a quick touch, as deeply as necessary at the right spot, and must then rapidly be lifted out again, lest the heat emanating from the cautery damage the eye. In carrying out this somewhat difficult treatment I take care to have a firm rest for my arm and hand, and I enjoin my assistants to concentrate their entire attention on what they are doing. A single slip might damage the eye irretrievably. For large angiomata I find the application of the galvanic wire very practical; it may be employed in

different ways. The platinum wire may be sharpened to a needle point, and then carried round the base of the tumour. For the first time this does very well, but later on the wire softens from the heat and the point becomes blunt. Should the tumour offer resistance at any point the wire cannot be got through it. On the whole it is safer to carry the wire round by means of a long, stout, straight needle, passing it through the base of the tumour, or else to thrust a fine trocar beneath the growth, and then pass the wire through the canula. Some bleeding certainly follows, but soon stops when the wire is heated again. In adopting this method the wire should only be raised to a red heat; if it be made white hot, it cuts too quickly and severe hæmorrhage will be the result.

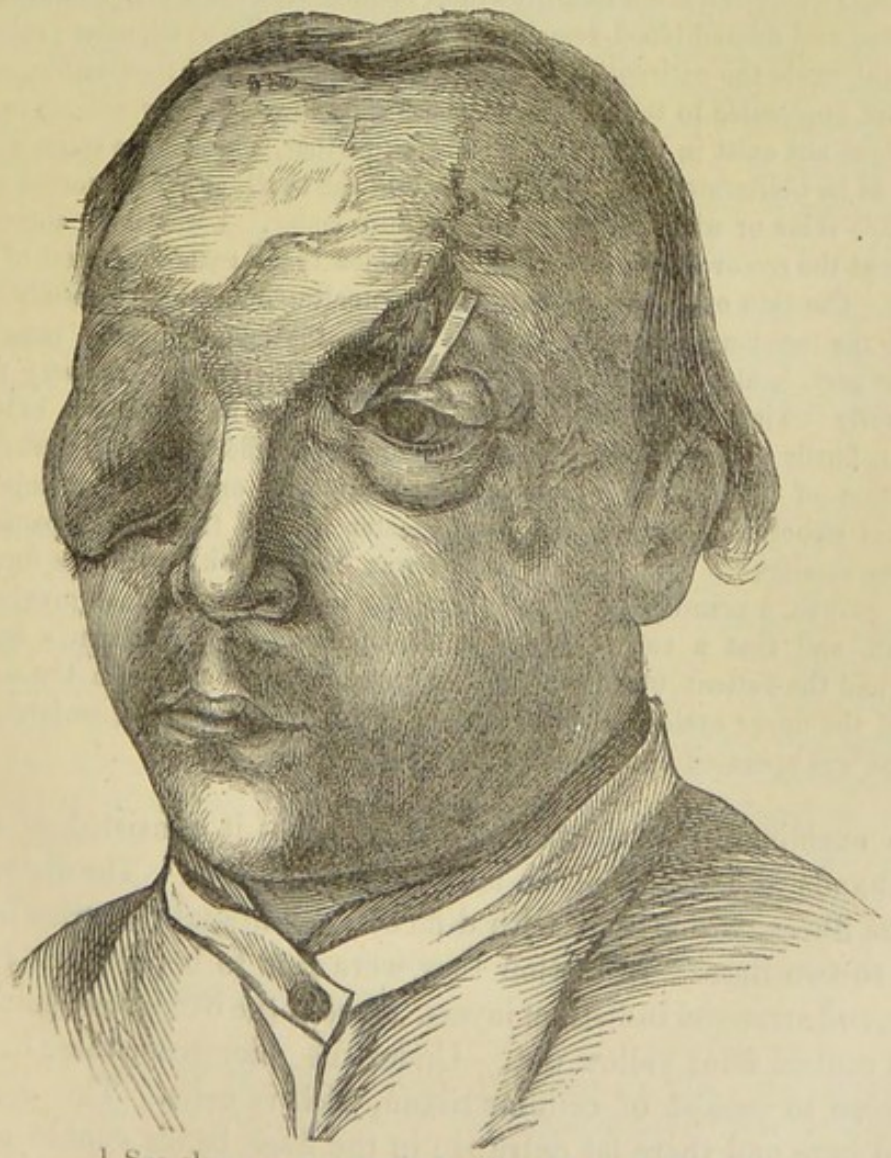
FIG. 4.—MULTIPLE SOFT FIBRO-FATTY TUMOURS.



Multiple soft fibro-fatty tumours. (Leontiasis, molluscum lipomatosum, elephantiasis arabum).[1]

Case.—The patient was 33 years of age, and had suffered from the above affection for thirty-one years. The condition will be best understood by the illustration (Fig. 4); the right eye was found to be destroyed—probably from panophthalmitis. A few similar tumours, varying in size from a pea to a bean, were found on the back and chest. The vision of the left eye was normal, but the patient was unable to see unless he raised up the folds of the eyelid with his fingers, or arranged his hat so to keep the pendulous masses out of the way. I operated on him on twenty different occasions. The ultimate result is shown in Fig. 5. When he left there was a slight ectropium, and he had not recovered any power in his left eyelid. I did not, however, dare to diminish the size of the lid any more, for fear of endangering the cornea. A strip of plaster was applied, so as to keep the fold raised and enable him to see.

Fig. 5.—The same as in Fig. 4, after Twenty Operations.



[1] See also a case described, infra, Chap. X, Section A.

Neuro-fibroma. (*"Neuroma plexiforme," Virchow.*)

In 1866 a student, æt. 18, of sturdy build, was sent to me. In the left temporal region he had a diffused swelling, which did not project in a globular form, but gave an appearance of widening to the temple, and caused the face to look awry. The swelling extended into the upper eyelid, perhaps also into the orbit, and was uniformly soft, save where some hard cords and nodules could be felt. Probably the tumour was of congenital origin; it had increased during the last few years so much that the left eye was concealed, and he could not obtain a situation by reason of the disfigurement.

A more minute investigation of the face and head showed as follows:—The zygomatic arch on the left side was considerably broader and thicker than on the right; the outer part of the left orbit and the anterior half of the left side of the skull were also widened. In the left parietal bone, close to the sagittal suture, an opening the size of a bean could be felt, in which the pulsation of the arteries of the brain was distinct. Taking all things together into consideration, I diagnosed a congenital diffused growth of cellular tissue and fat, permeated by obliterated and dilated blood-vessels. The opening in the skull, most probably congenital, made the extirpation of the tumour from the skull inadvisable, since it was not impossible to tell whether beneath the tumour similar defects in the skull might not exist in the temporal fossa, or further, whether the veins, which seemed to be obliterated, did not continue into the skull, either connected with the diploic veins or with the sinuses of the dura mater. I was loth, therefore to attempt the removal of the tumour, but yielded to the earnest request of the patient. The skin overlying the tumour was unaltered and was carefully preserved; the incisions were made in such a way that no deformity remained after the parts healed. The removal of the mass of the tumour was very difficult, partly owing to its situation, and partly from its ill-defined extent; however, finally it succeeded completely. Our chief difficulty lay in removing the portion of the tumour which projected into the orbit without injuring important structures; unfortunately the greater part of the levator palpebræ had to be sacrificed. I then found that I was dealing with that rare form of morbid growth, a neuroma plexiforme, one case only of which I had previously met with, and that a small growth in the upper eyelid. The parts healed kindly, and the patient was discharged in good condition but with the movement of the upper eyelid rather impaired; some ectropium came on later, for which he was operated upon by Professor Horner.

The examination of the tumour showed that it consisted of tortuous bands of a white colour, marked like intestine. The diameter of these fibres, which were with difficulty disentangled, varied from a half to two lines. In section they were seen to be of a pale grey colour, and arranged in distinct layers. Most of the bands were marked with a central faint yellow dot. Under the microscope these bands were seen to consist of cellular tissue, rich in cells. The centre showed here and there fat detritus; in the finer bands double con-

toured nerve fibres could distinctly be recognised. The cords were embedded in, and loosely connected to, cellular tissue containing a quantity of fat. I would have specially remarked that the tumour at the time of the operation was not painful, and had not previously caused any pain, had not this fact been frequently noticed in cases of neuroma.

Neuro-fibroma.

The patient was a girl, æt. 15. From an early age it had been observed that the right temporal region was rather thicker than the left. The swelling had increased very slowly since its commencement. When admitted, the right temporal region, the outer part of the right upper eyelid, and the upper part of the right cheek were somewhat swollen. The skin of the part was normal in appearance, and the swelling painless. The right eyeball was natural and its movements were not interfered with. The swollen part felt somewhat like a fibroma molluscum, and several hard nodules existed, which were tender on pressure. We diagnosed a plexiform neuro-fibroma, probably of congenital origin, as in most of the cases where this part of the body is affected. The growth was removed by two operations at an interval of sixteen days. Recovery followed, and the disfigurement was completely remedied. The neuro-fibromata were embedded in a soft, lobulated fatty tissue.

The following case, in which a cylindroma,[1] the nature of which was clearly established by microscopical examination, had not recurred three years after removal, is of such rarity that it deserves to be recorded.

A. V—, æt. 45, had suffered for two years from severe neuralgic pains in the right temporal and supra-orbital regions. Four months previously the existence of a tumour in the right orbit had been established. Vision was not interfered with; the eyeball was not markedly displaced, nor was the upper lid pushed forward. An incision was made through the upper lid, parallel with the supra-orbital edge. The connections of the tumour to the other contents of the orbit were severed with the scissors, and the growth was then separated away from the orbital roof by means of the raspatory. On the removal of the anterior part of the hard, nodulated tumour, the growth was found to extend back behind the eyeball. This was then removed and the rest of the growth extirpated. Three years later we heard that the woman was in good health and free from recurrence, but that still, from time to time, slight suppuration occurred from the back of the orbit. This might very probably have arisen from some small sequestrum.

[1] Cf. the author 'Surg. Path.,' Hackley's Trans., p. 635. He there states that no special class can be made of the "Cylindromata" (see another case, infra, p. 118).

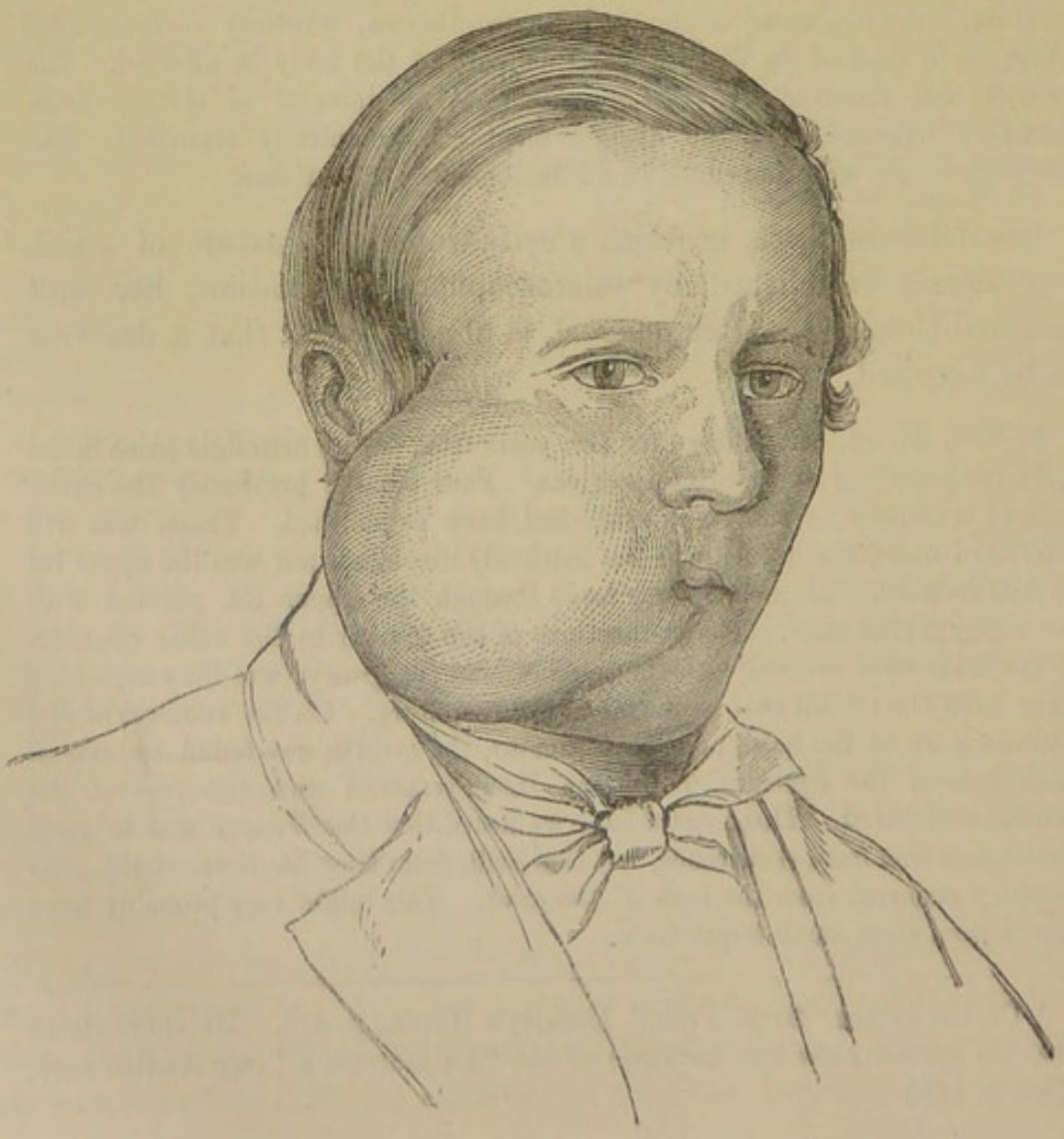
Echinococcus.

A child, æt. 10, was brought to me with left exophthalmus, which had been gradually forming for two years. On admission, I found moderate congestion of the retina, vision much impaired, and diplopia. Fluctuation was perceptible in the tumour. The diagnosis, at first rather doubtful, was cleared up by puncture and the evacuation of some clear, non-albuminous watery fluid. Rapid swelling followed with chemosis. An incision was made into the swelling, and a large white ecchinococcus sac extracted. The eyeball gradually resumed its natural position; the suppuration was very slight. When the patient was discharged the diplopia still existed as before the operation.

Fibroma of the cheek.

Case.—A strong man, æt. 41, was admitted with a tumour, the size of a large

Fig. 6.—Soft Fibroma, probably originating in the Spheno-maxillary Fossa.



fist, in the right cheek. The growth had first been noticed nine years previously, probably originating in the spheno-maxillary fossa. In four years it had reached the size of an apple, and was then removed, but soon recurred, and had continually increased up to admission. The tumour occasioned no pain and had caused no atrophy of the bones. It was removed, and six years later no recurrence had taken place. The growth proved to be a highly œdematous soft fibroma. (See illustration, Fig. 7.)

Fibroma of the parotid.

T. S—, æt. 4, had a tumour, the size of an orange, which had been growing for one year; it was removed successfully. The age of the patient and the rapid growth of the tumour render the case a rare one. It proved to be a simple firm fibroma.

Two cases of cyst of the upper jaw (hydrops of the antrum ?)

A woman, æt. 36, with very bad teeth and numerous stumps had a tumour, which had been forming for four years, without pain, and had attained the size of an apple. Distinct fluctuation could be felt. Six weeks previously to admission a tooth had been extracted over the inner half of the cyst, and a quantity of brown, viscid fluid escaped. The swelling soon after again resumed its former dimensions. The bone was not expanded over the tumour, the hard palate was not displaced, nor the eyeball prominent. The swelling was punctured from the mouth, above the alveolar process, the fluid evacuated, and tincture of iodine injected. Considerable swelling followed, which lasted for a few days; the tumour then collapsed. Six months later the cheek was rather drawn in, but there was no further accumulation of fluid. The cure was permanent.

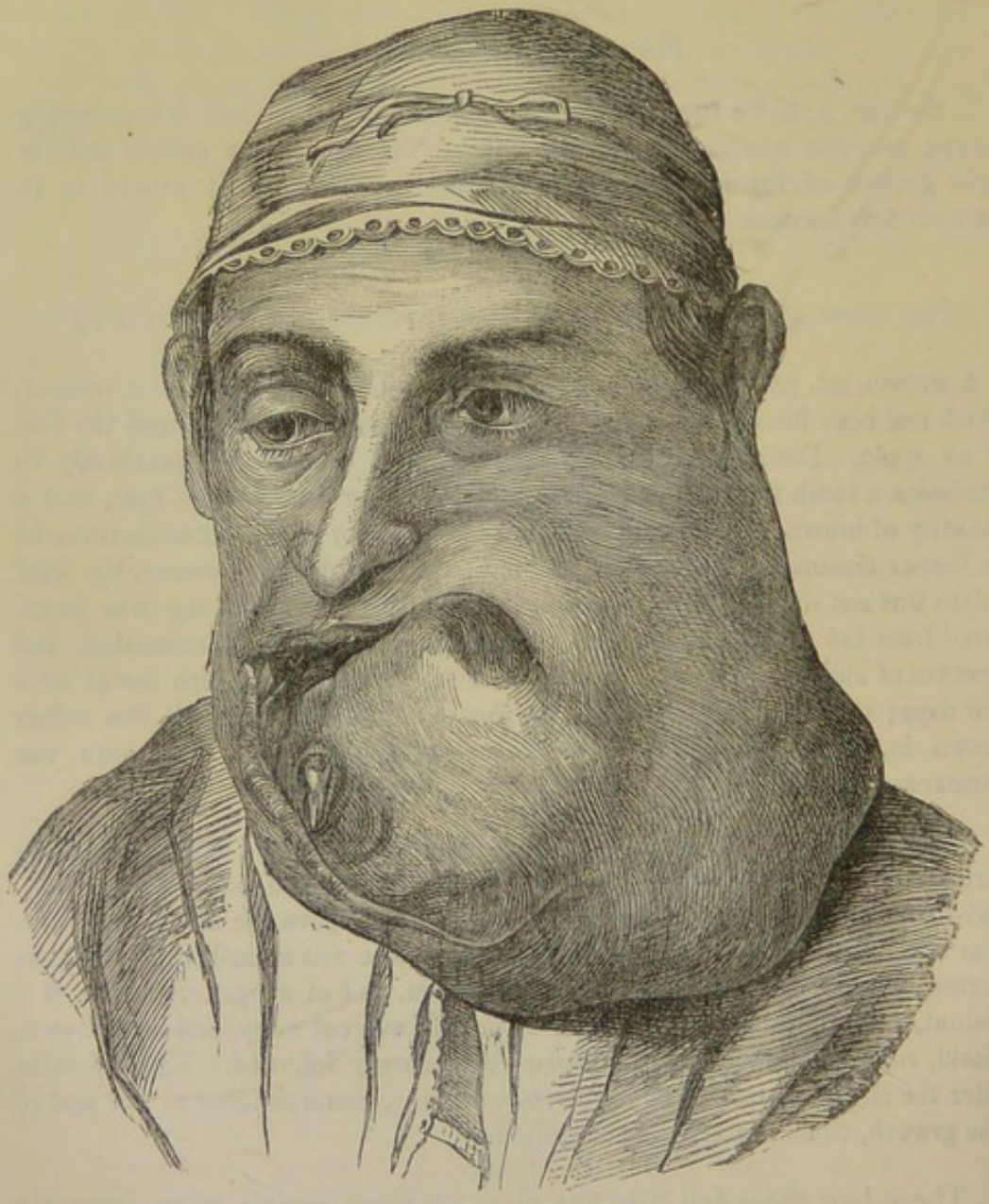
A robust man, æt. 25, had, six months previously, suffered from toothache of a right molar, accompanied by acute swelling: this yielded after a few days, but some enlargement in the alveolar process, close above the first right molar, was left. No pain in the swelling; the hard palate was arched over the part corresponding to the swelling. When admitted, he had a cyst, the size of a walnut, with thin, bony walls. The outer wall was cut away, and some brown, viscid, ropy matter evacuated. Complete recovery followed. Eight months later the slight depression of the alveolar process, corresponding to the seat of the growth, could scarcely be recognised.

These two cases fall into the class of those which were formerly spoken of generally as hydrops of the antrum. I do not think that these flat-walled cavities full of brown viscid matter are dilatations of the antrum. More probably they are formed in the alveolar process, and originate close above the sockets of the teeth. Opportunities of investigating the anatomical condition of

such cysts in the upper jaw are rare, and the correctness of the different views is therefore not easily ascertained.

While at Zürich I met with nine cases of osteo-fibro-sarcoma (epulis) growing from the alveolar process, all of which were in women: six were on the lower and three on the upper jaw. Since

FIG. 7.—OSTEO-CHONDRO-FIBROMA OF THE LOWER JAW.



these tumours usually project forwards from one of the alveoli, it is often a simple matter to remove them from the bone, but this is not always sufficient; it is necessary to bring about the exfoliation of the small bony surface on which the tumour lies, with the actual cautery, or else to remove a portion of the bone. This need

not be done, perhaps, always on the first occasion, but should invariably be practised after the first recurrence. In two cases in which repeated recurrence took place, the bone tissue of the maxillæ became gradually atrophied. An extensive resection of the superior maxilla was found necessary, after which no fresh recurrence took place. In one other case, at the third removal of the tumour by means of bone forceps, the inferior maxilla was fractured. Osseous union followed.

Osteo-chondro-fibroma of the lower jaw.

The tumour shown in the illustration (Fig. 7) was met with in a woman, thirty-five years of age, in whom it had existed for thirty-five years. She was operated upon by Dr. Menzel, but died of erysipelas. A full record of the case will be found in the 'Archiv. f. kl. Chirurg.,' I Heft, Bd. xiii.

Polypus nasi.

In large polypi my practice is invariably to break off the lower turbinated bone, as by this means recurrence is best obviated. Naturally, reaction is greater than after simple extraction of the polypus. In one case erysipelas followed the operation. The other patients recovered rapidly and completely. After two or three complete removals recurrence does not usually take place.

Naso-pharyngeal Polypus.

It is remarkable to observe how frequently polypus-nasi occurs in men, especially those between ten and thirty years of age. In this respect, these new formations resemble sarcoma of the jaw.

In eight cases osteoplastic resection of the jaw was performed, and the tumour was then removed with the écraseur or the galvano-caustic loop. The stumps of these polypi can often be felt some weeks after operation, but new polypi do not always develop and many of them atrophy. In small polypi rhinoscopic examination is of importance.

Fibro-cavernous naso-pharyngeal polypi.

R. K—, æt. 23, of strong constitution, was admitted in January, 1861. For two years he had noticed a gradually increasing obstruction of the right nasal cavity. Six weeks previously a surgeon had attempted to remove a tumour from this cavity; profuse hæmorrhage followed the attempt, but nothing was brought away. On examination, I found a fibrous polypus attached to the base of the skull, and extending into the right nasal cavity and antrum; the right side of the palate was thinned and pushed forward. Von Langenbeck's osteoplastic resection of the right nasal process of the upper jaw was performed, and the tumour was removed with the knife and scissors. The skull was seen to be somewhat thinned. On the third day symptoms of meningitis set in, with repeated rigors. Death took place on the eighth day after operation. Post mortem: a gap in the basilar process of the sphenoid bone was found. Purulent meningitis and abscesses in the lungs.

E. V—, æt. 22, a small, weakly man, had for two years noticed difficulty of breathing through the nose, which for the last twelve months had been completely stopped up. A large naso-pharyngeal fibroid polypus was made out, extending from the right nasal cavity, behind the velum and up to the cheek. The anterior and posterior walls of the antrum had been absorbed by pressure; the right half of the nose was much swollen. I operated as follows:—An incision was made, which commenced at the glabella, extended down by the side of the nose, and was then continued below, close to the septum nasi; another from the glabella, along the lower edge of the right orbit; a third from the right ala of the nose, parallel with the mouth, extending outwards for an inch and a half. These incisions were carried through the nasal bone and the upper jaw by the key-hole saw; the sawn portion of bone was then lifted up like a lid; the polypus thus plainly rendered visible was carefully removed with knife and scissors from its attachments, and the detached bone pressed back and kept in position by skin sutures and a compress. The wound healed hy first intention, and the patient was discharged in seventeen days. Nine months later he was in good health and free from any recurrence.

J. D—, æt. 27. Previous health good. In 1866, at the battle of Königsgrätz, he fell off his horse and bled at the nose and mouth. Towards the end of the year he observed some difficulty of breathing, and his comrades complained of his loud snoring at night. Gradually the symptoms increased, and at times he had severe hæmorrhage. He had been often advised to submit to operation, but could not bring himself to agree to it. At last the difficulty of breathing became so great that he could only sleep in a sitting position, and was much weakened by loss of blood. The polypus was attached at the upper part and on the right side of the pharynx by a tolerably broad base. It extended into and completely filled up the pharynx, so that it was visible below the soft palate. Since the nasal cavity was too narrow to admit of the use of the écraseur with any certainty, I performed osteoplastic resection of the nasal process of the upper jaw, and removed the polypus by means of the galvanic wire.

He recovered, and a year later I saw him again. There was no recurrence; both nasal cavities were perfectly free, no deformity existed, and the cicatrix was scarcely visible. There was, however, slight epiphora.

F. M—, æt. 41, noticed first in January, 1869, some obstruction of the left nasal cavity, and pain in the forehead; by July, 1869, the left side of the nose was completely choked up. A polypus was then removed by Professor von Dumreicher by the forceps, and the patient was discharged a few days later. Shortly after the operation the obstruction returned, and now extended into the right nasal cavity. On the admission of the patient a tumour, having the circumference of a small apple, with a gangrenous surface, was seen lying behind the velum. Superiorly the growth was attached to the upper part of the pharynx on the right side. The growth was removed through the right nasal cavity by means of the écraseur. On further examination after the operation a second small tumour, with a similar attachment, was found on the left side, and this was removed in the same way through the left nasal cavity. Discharged recovered. Fifteen months later he wrote and informed us that he was free from all recurrence and able to breathe without hindrance through either side of the nose.

F. H—, æt. 19, had suffered for three years from difficulty of breathing through the nose, swelling of the right half of the face, and frequent severe epistaxis from both nostrils. For the last few weeks deglutition had been interfered with. When admitted the whole of the right upper jaw was prominent; the anterior wall of the antrum reduced to a thin lamella; the right eyeball pushed forward, and on a higher level than the left. The hard palate on the right side was thinned and yielded to pressure; the velum was pushed forward as far as the middle of the tongue; the tumour entirely filled the pharynx, as well as the right nasal cavity. He was able only to count fingers with the right eye. The growth was removed with complete success by Dr. Menzel. An incision was carried down the side of the nose and through the upper lip. The remnants of the right superior maxilla were removed, and a tumour, the size of the fist, laid bare. This had a tolerably broad connection to the lower surface of the body of the sphenoid, a portion of which was removed, together with the tumour, but the cavity of the skull was not opened; the eyeball was preserved. No improvement of vision is recorded. Nine months later he was well, and free from recurrence.

Ranula.

While at Zürich I met with two cases in which sebaceous contents were found in the ranulæ: one was in a child of four years old, possibly a cyst in connection with the branchial fissure; the other in a young man. In both the cysts were slit up, and their walls united by sutures to the mucous membrane of the

mouth; considerable swelling of the parts beneath the tongue followed. The sutures were removed after four days, and recovery was permanent in both patients.

Formerly, my practice was to lay open the cysts from the mouth, as extensively as possible, and then to unite the wall of the cyst to the mucous membrane of the mouth; where the ranula consists of a sebaceous cyst, I should still do this, having previously washed out the sac thoroughly. Lately, however, I have preferred to pass a thick silk thread from the mouth through the upper wall of the ranula, and then to knot it in the mouth, without drawing the string very tight. If the wall of the cyst is not too thin the threads are allowed to remain three or four weeks; they then fall out, and the cysts shrink up and are cured. Most of these cases were treated as out-patients. They did not usually come before us unless the swelling was very considerable; sometimes they did not return for many months after the threads had been inserted, when the latter were found sometimes crusted over, but still in position. If the cyst wall be very thin, and the thread tied very tightly, the latter cuts its way through in a few days, and then the growth is sure to refill. If the operation is conducted in the way I have described it is of so trifling a nature that it does not matter if it requires to be repeated, in case the opening in the cyst happens to close up prematurely. The remarkable preponderance of ranula in the female sex is very striking.

Congenital papilloma of the tongue.

A youth, æt. 13, was admitted for a remarkable kind of degeneration of the upper surface of the tongue. The organ was rough, uneven, and covered with growths of various sizes, from one to two lines in height, composed of soft hypertrophied papillæ. This condition had been observed in a slight degree from the time of birth. From time to time little ulcers had formed and slight bleeding had taken place. Recovery followed after repeated removal with the scissors and galvano-caustic puncture.

Sebaceous cyst.

A cyst, the size of a bean, which had commenced four months previously, was removed from the upper part of a tongue of a child æt. 12; the whiteness of the sac gave the tumour the appearance of a cysticercus, but it proved on microscopic examination to be sebaceous, probably of congenital origin.

Section F.—Malignant Tumours.

Cancer of face—Cases. Cancerous ulceration of cheek leading to necrosis of jaw. Case of rodent ulcer (?); remarks. Notes on epithelioma of the face; of lip. Cases of sarcoma of cheek. Cancer of salivary gland, tongue, etc.; remarks. Sarcoma of salivary glands; remarks. Case of medullary lymphoma of tonsils; death. Case of alveolar cancer of tongue. Ligature of lingual artery for cancer. Remarks on cancer of tongue—Cases. Sarcoma of orbit; mixed celled; "psammon;" periosteal. Exploratory puncture of orbital tumours—Case. Cylindro-sarcoma. Cancer of orbit; removal. Hernia cerebri, etc; recovery. Sarcoma of lower jaw; central; periosteal. Note on maxillary tumours. Sarcoma of nose. Malignant polypi of nose.

Cancer of the face.

K. S—, æt. 50, had had for eight years a wart on the left ala of the nose, followed by ulceration and the formation of crusts. On admission, the left ala of the nose was completely destroyed, and the superficial cancerous ulceration of the skin spread over the cheek to some extent. The defect in the cheek was supplied by a flap transplanted by a sliding movement, and the left ala replaced by skin borrowed from the right side of the nose. The parts healed by first intention.

As far as the appearance of the patient was concerned the result was not good; the flap made by the sliding movement became œdematous and thickened—a condition however, which would tend to improve. The thin skin over the left ala of the nose shrivelled up, and the nostril in consequence was much narrowed; this latter imperfection might probably have been improved by the introduction of laminaria tents and lead tubes. No further record of the patient was obtainable.

F. B—, æt. 61. The nose had been excoriated by a fall two years previously; following this a small knot developed slowly at the end of the nose, which by degrees spread over the ala and invaded the left cheek.

This was a case of infiltrated cancer, growing rather rapidly. The defect in the cheek was made good, as in the previous case, by skin borrowed from the cheek, and then complete rhinoplastic from the forehead was performed; six weeks later the bridge was cut through. Although healing did not

follow by first intention, the ultimate result was good. Two years later she had no recurrence, and was able to breathe well through the nose.

These two cases were so far peculiar that in both a considerable portion of the cheek was destroyed as well as the nose. In such instances the surgeon may proceed in different ways. Formerly, it was the rule to make the flaps from the forehead of such shape and size that they covered the whole of the defect. The result of this usually was that the new nose did not fit well where the flap from the forehead passes over to the cheek. I have preferred therefore, in such cases, after complete excision of the diseased part, to commence by closing the defect in the cheek, leaving then only a raw surface, suitable for the application of the new nose. This is covered from the forehead in the ordinary way. In order to close the defect in the cheek, the skin must be drawn over after that horizontal incisions have been made, either above, below, or on both of these places. In this way a flap, with a broad base externally, can be obtained, or else, according to the form and situation of the gap, a flap from the cheek must be made with its base either directed upwards or downwards. If made in the latter way the parts are apt to remain œdematous for a long time; in all cases the defect in the cheek should be closed in such a way that there is no tension or lateral traction on the edges of the wound to which the skin forming the nose is applied.

B. U—, æt. 58. Six years before admission a knot, the size of a lentil, appeared on the left ala of the nose, which during the next five years grew but slowly; it scabbed over, and at times bled. The year following, the ulcer began to increase more rapidly. On admission, almost the entire nose, and a portion of the upper lip below the septum was destroyed by the superficial cancer of the skin. The whole ulcerated surface was cut away, and a rhinoplastic operation from the forehead performed. The skin of the forehead was rather thin. The pedicle was formed at the upper part of the inner palpebral angle. As far as appearance went, the result was not good, for, from the thinness of the skin and subsequent shrinking, the nose was not sufficiently prominent, The condition was but little improved by subsequent operation.

In rhinoplastic from the forehead, I prefer to make the pedicle as deep as possible, and find it best to use the skin in the neighbourhood of the glabella. By this method the cicatrix of the forehead is smaller and shorter than when the pedicle of the flap is taken from above the eyebrow; if the pedicle be cut thick, the greatest care must be exercised not to miscalculate the length of the

flap. In the last-mentioned case I made this mistake. I tried then to obviate it by freeing as much as possible the pedicle of the flap towards the orbit, and the new nose was certainly united successfully in this way. Its direction was, however, at first somewhat crooked, and had to be corrected subsequently. Nor was this the only mishap. In order to make the pedicle of the flap as thick as possible I had removed the periosteum from the glabella as far as the internal palpebral ligament. Two days later a prodigious exophthalmus came on, evidently from œdema of the tissues around the bulb. For a week the condition was very critical, and I feared lest suppuration should occur in the orbit. Fortunately, then the swelling disappeared spontaneously, and no damage to the eye resulted.

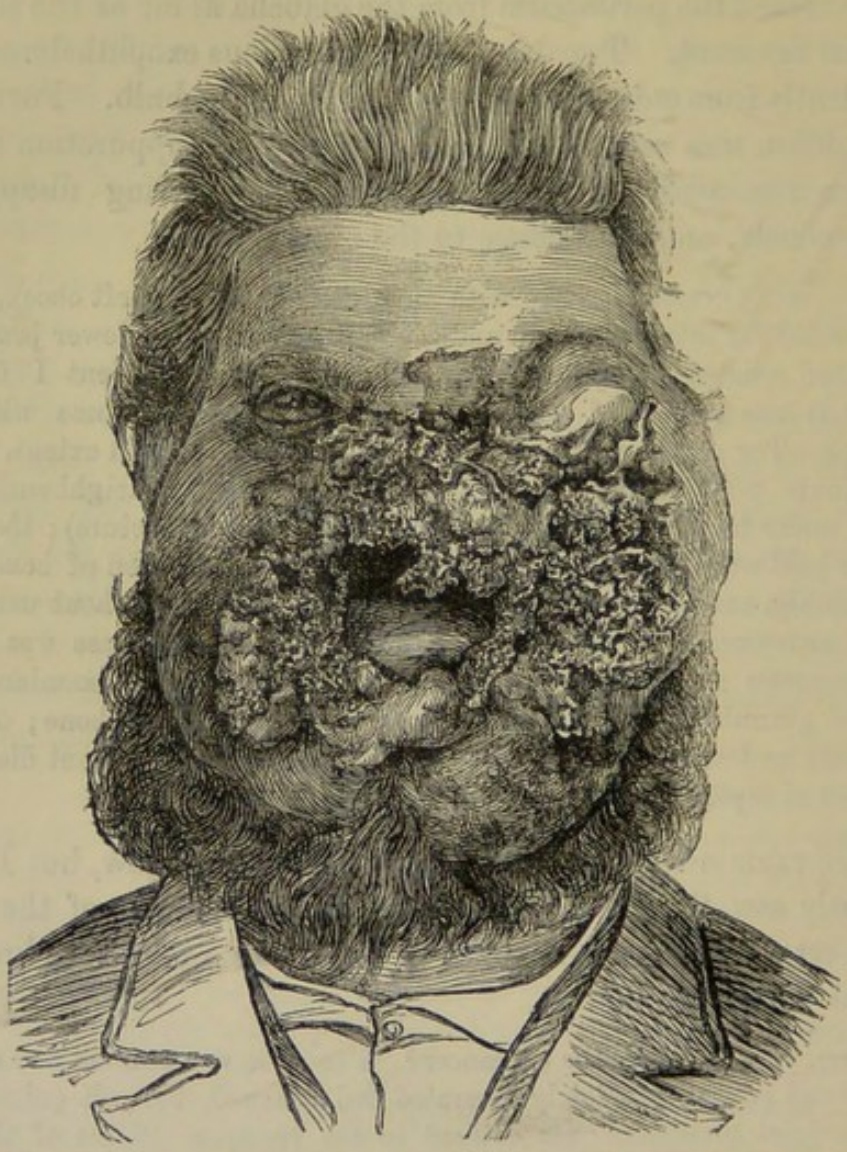
M. S—, æt. 52, was admitted with an ulceration of the left cheek, which had extended far into the mouth and gradually attacked the lower jaw. The disease had existed one year. When I first saw the patient I doubted whether it was a case of necrosis of the jaw, or a carcinoma with foul discharge. The mouth could only be opened to a very small extent. On a more minute examination I found the lower jaw in the neighbourhood of the first molar tooth completely destroyed (spontaneous fracture); the entire posterior half was bare and necrosed. I removed the portion of bone somewhat forcibly, and was able to twist it away at the joint without using any cutting instrument. I thought now for certain that the case was one of simple necrosis of the jaw, but in order to make sure I examined some shreds of granulations which were attached to the extracted bone; on these were found undoubted elements of epithelial cancer. The patient died a few days later of septicæmia.

I have examined many cases of carcinoma of the jaw, but I never previously saw the disease lead to complete necrosis of the bone. Such a result can evidently only be caused by a complete breaking down of the new formation.

M. D—, æt. 33. Syphilis or cancer? The nose was swollen and stopped up, the hard palate completely ulcerated and softened, the soft palate gone, and superficial ulceration was evident in the pharynx. Some of the submaxillary glands were hard and enlarged. The disease, which had existed for three years, and commenced with dysphagia, infiltration, and pain in the soft palate, had been considered by everybody who saw it to be of a syphilitic nature. Antisyphilitic remedies of various kinds had been employed, but without any success. I myself was forced to conclude that I had before me a rare form of syphilis. The patient was so strong, and the course of the disease so gradual that the other alternative, viz. epithelial cancer, could not be entertained. Professor Hebra, whom I consulted about the case, held that it was an epithelial cancer; in order to make sure, I removed a small portion and examined it microscopically. It proved to be a cancer. We

ceased to torment him any longer with remedies, and he was discharged. Fourteen months later we heard that the unfortunate man was still alive, but in a deplorable condition. Finally the ulceration spread to a most terrible extent (see Fig. 8), and he died six years and a half after the first commencement of the disease.

FIG. 8.—CARCINOMATOUS ULCERATION OF THE FACE AND JAWS.



This case is one of extreme rarity, since it forms an exception to the rule, that cancers originating in the mouth develop rapidly. It is a form of carcinoma which seems somewhat analogous to the superficial cancer (ulcus-rodens) of the skin. It certainly gradually destroys the bones, but very slowly, and is especially characterised by very late infection of the lymphatic glands. I remember to have seen five or six cases where superficial epithelial cancer of the nose, the cheek, or the eyelids, lasted from ten to fifteen years, and finally

destroyed the whole of the upper jaw or the bones of the skull, without infiltrating the lymphatic glands. That such a form of cancer ever began in the mouth was to me a new fact.

All the cases observed at Zürich were—with one exception—superficial ulcerated epithelial cancer. With regard to recurrence in these cases, I should mention that this mostly occurred after removal of portions of the skin overlying bone. I could not always persuade myself to entirely remove a bone to all appearance perfectly healthy, or even to remove much of it. In some cases, as, for instance, when the frontal or ethmoid bone were affected, this was not possible. What I have learnt from these cases, however, would induce me to cut more boldly hereafter than I have in the past. According to my experience, it may be laid down almost as a principle that, when a patient who has been operated on for cancer of the face or lip has no recurrence either continuous or infective in the lymphatic glands from six to eight months later, there is the greatest probability that, at the least for many years, often for the rest of his life, he will have been cured by operation. Local recurrences coming on after the lapse of some years, comparatively frequent in the case of sarcomata, are very rare in cancer of the face. It becomes still more urgently important, therefore, to operate as early as possible and to operate freely.

From a list of 252 cases it was shown that the lips were more frequently attacked with cancer than any other part of the skin of the face. The lower lip and the angle of the mouth are especially liable to this disease. Primary cancerous diseases of the upper lip are exceedingly rare. The great preponderance of the male sex is shown markedly by the list of patients (196 male, 56 female), and the same difference between the relative frequency with which the sexes are attacked shows itself also, though to a less extent, in cancer of the upper parts of the face. Operations for cancer of the skin of the eyelids, and also of that of the face generally, show a much larger mortality than when the lip or the skin of the nose was affected. I am unable quite to account for this. In all these groups of operations, some part or other of the bones was at times laid bare or resected, but not more in one group than in another. In some of these cases plastic operations were performed subsequently, but this will not account for the difference of the mortality, which was twice as great in the two groups of cases first mentioned.

Cancer of the Face, Nasal and Oral Cavities.[1]

Epithelioma of the lip.

Of thirty cases occurring in my practice at Zürich, twenty-nine were on the lower and one only on the upper lip. The duration of time which the patients allowed to elapse from the commencement of the disease up to the first operation varied exceedingly. Any attempts to make use of records with regard to recurrence, extension of degeneration, and especially of the infection of the lymphatic glands, meets with insuperable obstacles. The greatest variations are found in respect of the rapidity of growth, and the time at which the glands become infected. The impression that I have formed is that, speaking generally, the progress of the disease is slower in proportion to the lateness of the age at which it first occurs. Further, when the disease commences with the formation of epithelial scabs and fissures on the edge of the lip (*i.e.* superficial epithelial cancer, starting from the rete Malpighii) the progress is more slow, and the lymphatic glands are affected later, than when the cancer commences in the form of small nodules in the substance of the lip, or as ulceration on its inner surface (*i.e.* infiltrated glandular follicular epithelial cancer). This last form attacks the glands remarkably early.

All the thirty cases mentioned were operated upon. In some of them the operation extended beyond the lip, when infiltrated glands in the neck required removal. In cancer of the lip I never employed drugs, and have been no case hitherto in which any improvement followed local remedies. On the other hand, I have seen numerous cases where the patients have been tormented with the repeated application of caustics, which have done no good. Some highly satisfactory results are shown in my tables. Nine of the patients were so far improved by operation that they were in the best of health from two to seven and a half years afterwards. In five others recurrence followed so rapidly after operation that we could only suppose that some of the growth had been left behind. Most operators are very sensitive to any suggestion that any remnants of cancer have been left behind in the patients who have been

[1] Elaborate statistical tables will be found in the 'Züricher Bericht,' pp. 120–144.

under their care; it is certainly a reproach, but not always the operator's fault. I have occupied myself a great deal in the investigation of tumours, and fancy that I am able to recognise all the different forms on section when fresh. I must, however, admit that under some circumstances it may be exceedingly difficult to know exactly whether all the disease has been removed, especially in operations that are conducted in deeply lying parts, as the neck, uterus, or rectum. Not infrequently the conviction is forced upon you too late that it is impossible to remove all the disease without running a fatal risk. When patients come back early to the surgeon with "continuous[1] recurrence" in the lip, a thorough new operation should be performed. This can be done with good prospect of success, as in the case of a young man who had some cancerous nodules in his lower lip, which had been growing for a year and a half; these were removed. The disease soon recurred and grew rapidly. The prognosis seemed very bad. The growth was freely removed, and five years later he was quite well. We must acknowledge how powerless we are against cancerous infections of the lymphatic glands. At the time of operation the affection may be so slight as to escape detection by touch. When removed the number of glands, especially in the neck, is often so great and the region is so difficult for the operator, that some, which though very small are already affected, may very easily be overlooked. My advice is to operate on cancer of the lip as on other carcinomatous growths as soon as ever the diagnosis is established, and before the lymphatic glands become affected. If surgeons would act on this principle the cure of these cases by operation would not only be more frequent, but, I trust, might even become the rule.

Sarcoma.

A man, æt. 63, had five years previously observed the development of a nodule in his right cheek. In the course of two years it had attained the size of a hen's egg, and broke into the cavity of the mouth, discharging pus and some small lumps of fleshy appearance; the opening closed. A year later a new formed tumour, which had reached the size of a fist, broke again into the cavity of the mouth; the wound again closed up and healed and the swelling markedly diminished. Since that time the tumour had again grown to the size of a man's fist, and when the patient came under treatment was scarcely

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[1] "Continuirlich."

movable on the upper jaw. The tumour, which proved to be an encapsuled cystic myxo-sarcoma, was shelled out without the removal of any part of the bone. Recovery followed. Four years later the patient was in good health, though the tumour recurred shortly after the operation and became ulcerated, without, however, augmenting to any great extent.

Infiltrated sarcoma.

F. S—, æt. 40, fell, when twenty years of age, on to the right side of his face. Considerable swelling occurred, which never entirely disappeared but gradually went on to the formation of a slow growing tumour. Four years after its origin v. Pitha removed the growth, resecting at the same time the whole thickness of the jaw. The patient then remained well for sixteen years; then a new tumour occurred in the portion of the right side of the jaw which had been left, and in six weeks had attained the size of the fist, causing very severe pain. The growth was removed, and the portion of the jaw exarticulated. Convalescence was rapid, but recurrence soon took place again. The growth was again removed, but once more the tumour recurred and carried off the patient, a year and two months after the commencement of the second growth.

Cancer of the Mucous Membrane and adjoining Organs—Salivary Glands, Tongue, and Cavity of the Nose.

Anatomical investigations have led me to the conclusion, that cancer of the upper jaw and the cavity of the nose mostly originates in the follicles of the mucous membrane of the antrum, nasal cavities, palate, or gums. In the lower jaw it is easy by observations on patients to show that the disease starts from the lip, the mucous membrane of the mouth, the tongue, or the parotid gland, and spreads over on to the bone. I have never seen, hitherto, a genuine primary cancer of the lower jaw. It is a remarkable fact that the soft medullary cancers of the upper jaw and the cavity of the nose very rarely affect the lymphatic glands of the neck. Even when the glands are attacked it occurs very late; this may partly be explained by the anatomical conditions. Perhaps the mucous membrane of the nose and antrum is poorly supplied with lymphatics. As yet we do not know much about this.

With respect to the etiology, I have already stated that I entirely acknowledge the influence of local irritations on the origin of cancer; still I am of opinion that such irritation only then leads to the formation of a tumour, or to the direct development of cancer, if

the affected individual be predisposed to it by hereditary causes, age, etc., whether such predisposition be considered chiefly local or general. Incidental causes are always inquired into, but comparatively seldom can anything definite be discovered; thus, in my list of cases repeated attacks of erysipelas, injuries, blows, burns, irritation from stumps of teeth, cicatrix of an abscess, and the like, are given as the causes of origin. Of eighty-nine cases, I have myself examined post mortem eighteen, and have never found any cancer in the internal organs. This, as contrasted with my former experiences at Berlin, appears to me worthy of remark. In one case, besides a superficial epithelial cancer, I found a contracted carcinoma of the breast. Investigations as to the hereditary tendency to cancer or a "tumour diathesis" were exceedingly difficult, inasmuch as in Zürich, among the common people, the term "tumour" is used indiscriminately to signify furuncle, abscess, swelling of the joints, etc., so that I can give no reliable information on this point.

Very peculiar forms of sarcoma are met with in the salivary glands, and the diagnosis often presents great difficulties, which can only be cleared up by very careful examination under the microscope.

Even with this aid pathologists do not always agree. Difficult questions often arise, such as a differential diagnosis between alveolar plexiform sarcoma, and carcinoma. I will only consider for the moment the parotid gland. In these cases, many clinical symptoms have to be taken into account to assist our diagnosis. I never hesitate to pronounce a parotid tumour to be carcinomatous when it is absolutely immovable, hard and ulcerated, and when the cervical lymphatic glands are affected. In small tumours of the parotid region (say up to the size of a hen's egg), occurring in persons on the wrong side of forty, the immobility, pain, cicatricial contraction in the growth, facial paralysis, etc., would lead me to judge that the case is one of carcinoma.

Most of these tumours of the parotid gland[1] are myxo-sarcomata, or enchondromata, the latter being sometimes cystic. In the great majority of cases facial paralysis follows after the operation. In only one case (that of a rapidly growing granulation sarcoma), which was not operated upon, was it due to the pressure of the tumour. When the trunk of the nerves was cut through in the parotid the paralysis was permanent. In those cases where single branches only

[1] These remarks refer to the cases under observation and treatment between 1860—1876.

were divided, improvement followed in the course of a year or so and in some instances the paralysis completely disappeared. The majority of the tumours originated between the ages of ten and thirty.

Medullary lymphoma of the tonsils and the submaxillary lymphatic glands.

J. T—, æt. 62. The tumour, which was of moderate size, had been noticed four weeks previously, first externally, later internally. The velum on the right side was pushed forward to a great extent, and the tumour bulged out from beneath it; breathing and swallowing were difficult. Osteoplastic resection of the lower jaw was performed and the tumour completely extirpated. The operation was long and very extensive, and death took place from exhaustion two days later.

Alveolar cancer of the tongue.

J. F—, æt. 57. Five months previously a small lump had appeared in the left half of the tongue, which grew rapidly, and caused pain. The tumour, which was the size of a walnut, was removed by the écraseur. The growth was of a very peculiar character, showing a combination of a branching chondroma with alveolar cancer (Drüsenkrebs).

Eighteen months later he was seen again. There was then no recurrence in the tongue or swelling of the lymphatic glands. He died a few months later of lung disease.

W. K—, æt. 57, had first noticed pain and hardness of the right half of the tongue six weeks before admission; a cancerous ulcer, which extended far back, was seen on the right side of the tongue; no enlarged glands could be felt; he could only open the mouth to a small extent. In order to avoid hæmorrhage as much as possible, I commenced by ligaturing the right lingual artery. I performed the operation lege artis, but had most extraordinary difficulty in discovering the artery. Finally, I thought I saw it pulsating, and placed a ligature round it. The mouth was then forced open, and it was found that the disease involved the inner surface of the lower jaw on the right side. I completely resected the diseased portion of the maxilla, and was then able, very conveniently, to remove the whole diseased portion of the tongue as far back as the larynx; this was done with great care.

Had I known previously that it would have been necessary to extirpate the lower half of the jaw, I should naturally not have ligatured the lingual artery. In removing the lower and under

portion of the tongue, tolerably free hæmorrhage occurred from the lingual artery, and I had my doubts as to whether this vessel had actually been tied. The patient died two days later of septicæmia. Post mortem, we discovered that the lingual vein had been ligatured instead of the artery. Every surgeon knows the difficulty of tying the lingual artery in old people; the vessel lies so deep that it is very difficult to distinguish it from thick-walled distended veins, especially when owing to heart disease—as in this case—the veins pulsate. Never previously had I met with a lingual vein of such thickness. In the dead subject the veins are usually empty, and the conditions are so different that no opportunity is afforded for practising properly these delicate, but—under some conditions—very valuable operations.

Cancer of the tongue and the mouth.

Of forty-eight cases met with between 1860—1876, forty-two were operated on; fifteen died after operation, three died from other accidental circumstances. The disease commonly begins between 50 and 60 years of age, but one of my patients was 70 years old, and two others between the ages of 27 and 29. A man, in whom the disease had extended far back into the pharynx, died from periœsophagitis, mediastinitis and septic pleuritis, which were set up by the passage of a probang through the walls of the œsophagus. In one man the lingual artery was ligatured on both sides, in the hope that the infiltration of the tongue in the cavity of the mouth might diminish. However, the ligature led to no good results, nor did any rapid breaking down of the already ulcerated new formation occur.

In thirteen cases I operated from the neck; eight of these patients died after the operation. In one instance the lower jaw was sawn through at the side, and an ivory plug was introduced into the medullary cavity. Death followed from osteomyelitis of the lower jaw. In thirty-two cases I removed the cancer from the mouth, in twenty-one instances I ligatured the artery on one side, and in two on both sides. Altogether, including the case mentioned above, the lingual artery was ligatured twenty-seven times; no secondary hæmorrhage ever followed. The wounds always healed satisfactorily, and since I took to inserting a small drain, usually closed by first intention.

Écrasement I have of late discarded, but on five occasions I removed the growth with the galvano-caustic loop. However, I have quite given up both these methods, for the following reasons:— 1st. In separating the tongue longitudinally, hæmorrhage cannot be completely guarded against: even if the platinum wire be only moderately heated the loop cuts its way too easily and quickly, as the bundles of muscle are arranged parallel to its track. 2nd. Bleeding does not occur from the fore part of the tongue to any great extent, and by means of the knife the removal of the cancerous disease can be more accurately effected. 3rd. In cases where the degeneration of the tongue extends far back and reaches low down, it is not easy to be sure of removing all the diseased portion with the loop, by reason of the irregular depth to which the disease extends. Small fragments remaining on the cauterised surface cannot be readily recognised, and even if they are detected, their subsequent removal is usually attended with considerable bleeding. Finally, excision with the galvano-caustic loop gives no security against diphtheritic disease of the wound, and one of my patients died from this affection.

Latterly I have given up uniting the operation wounds by sutures. I cannot assert that the sutures bring about any evil results, but I find that patients have much less pain after the operation if no sutures are inserted, for the tongue does not swell so much and the secretion of saliva is much less in amount and does not last so long. When portions of the floor of the mouth were excised, an opening was always made towards the neck, in order to facilitate the discharge of the secretions. This arrangement is very comfortable for the patients.

As regards removal of the tongue from the neck, different operations have been proposed and practised by Regnoli, Czerny, and myself, but I regret to say that the hopes which I formerly entertained have, unfortunately, not been confirmed. Wider experience of the operation seems to show that it is of a more dangerous character than from the first few cases it appeared to be. In a list of thirteen such operations, eight deaths were recorded; diphtheritic inflammation of the surface of the wound, followed sooner or later by metastatic affections, was in all the cause of death. We took the utmost precautions in order to obviate, if possible, this diphtheritic inflammation of the mouth; the mouth and the teeth were always carefully cleansed for several days beforehand. Solutions of per-

manganate of potash were repeatedly tried. I applied sometimes strong chloride of zinc solution to the fresh wounds. In many cases I united the mucous membrane with sutures in such a way as to establish, for the first few days, a sinus through which the secretions might drain away; but even all these precautions are not sufficient to guarantee against the occurrence of diphtheritic inflammation of the mouth. A remarkable and interesting fact was often noticed at the post-mortem examinations of these cases, namely, the existence of numerous abscesses in the brain. Diffuse meningitis is often found. In two cases, indeed, this latter affection was diagnosed during life from the hemiplegia, which in one instance came on suddenly, as in apoplexy. It seems that in many cases at least the inflammatory process does not extend by thrombosis and embolism, but rather spreads along the sheaths of nerves, such as the lingual nerve. In one instance it was possible to prove this by a preparation. Lobular embolic pneumonia,[1] manifested by small lobular inflammatory areas, seems to be the most common direct cause of death in these patients after operation, as also in cases of resection of the lower jaw; it is much less often associated with pleuritic effusion than the small secondary embolic abscesses of the lung. The mere fact that the small bronchi are full of mucus, purulent catarrhal secretion, or blood, does not of itself entail any great danger, so long as the power of expectoration is good. But the minute diphtheritic particles find their way into the bronchi from the wound surface in the mouth (especially when the power of swallowing is impaired), and affect not only the bronchial mucous membrane, but the very substance of the lung. This variety of broncho-pneumonia (capillary bronchial diphtheria) is so much the more injurious, for often for many days there is scarcely any power of expectoration.

In 1877 (at Vienna) I gave up the operation for removal of the tongue from the neck, and adopted the plan of cutting through the jaw at the side, and thus obtaining access to the deeper parts, following in this v. Langenbeck's example, the advantages of which over my own method I fully recognise. I cannot for the present say whether there is any difference in the mortality after the two operations. The results of removal of cancers in this region are, on the whole, very unfavourable as regards recurrence; even very extensive operations give no better results. Only by operating at an earlier period can this state of things be improved. In

[1] "Fremdkörper Pneumonie."

very few cases were the patients free from recurrence for any number of years. Somewhat larger is the number of those in whom after operation on the tongue, recurrence does not take place locally, but in the lymphatic glands. This happened in about one third of my cases; in two-thirds of the cases recurrence took place in the neighbourhood of the cicatrix and in the lymphatic glands a few months after recovery from the operation.

Cancer of the tongue is a remarkably common affection in Vienna.

Small-celled granulation sarcoma and myxo-sarcoma of the orbit.

J. F—, æt. 55, a stout, strong man, had noticed six years previously that his right eye was becoming prominent. On admission, the exophthalmus was excessive. The tumour moved uniformly and equally with the eye, but the movements to the right side were much more limited than to the left. The right cornea was softened and completely destroyed; the left eyeball intact. From the nature of the movement an intraocular tumour was diagnosed; the whole contents of the right orbit were removed, including the periosteum. Close to the foramen opticum the bone was so thin and soft that we had to proceed with the greatest caution; it was doubtful, therefore, whether the extirpation was complete. The tumour lay between the eyeball and the muscles, completely surrounding the former but without growing into it. Recovery followed. At the bottom of the orbit granulations could be seen, but so far as could be made out there was no recurrence when he was discharged. Eight months later we heard that the tumour had recurred in the orbit, but it seems probable that this was only a little hypertrophy of the cicatrix, for a year and a half after he wrote that he was in good health, and able to follow his profession as a teacher and an organist.

The case shows that, notwithstanding the apparently unfavourable conditions of tumours of this nature, they can be extirpated successfully; without operation death must soon undoubtedly have occurred. Unfortunately successes like these are only too rare.

Psammon-sarcoma (Virchow) of the orbit.

S. B—, æt. 16. Eight years previously exophthalmus had been first noticed, and the vision shortly afterwards became impaired. The tumour, which developed gradually, gave no pain. On admission a growth of the size of the fist projected from the right orbit, and the eyelids were increased to nearly double their natural size; still, they could be completely shut and opened. An immovable atrophied bulb was seen on separating the eyelids. The orbits

were distinctly widened, especially externally. The tumour was not sensitive on pressure. Pricking sensations were felt in the tumour on touching or combing the right side of his head; no pain in the head; general condition good. The tumour was removed from the orbit; this was followed by such bleeding and collapse that the patient's life was with difficulty saved at the time. A few hours after the operation vomiting occurred, followed by unconsciousness, and he died six days after the operation. Post mortem: extensive suppurative meningitis was found, especially on the right side. The tumour had broken into the orbit above, and on the inner side extended somewhat into the cavity of the skull and surrounded the atrophied optic nerve. The tumour proved to be a psammon-sarcoma (brain-sand tumour), possibly commencing from the sheath of the optic nerve.

Ossifying periosteal sarcoma on the upper edge of the orbit.

D. D—, æt. 32. A year previously he noticed a tumour situated on the upper border of the orbit. It grew rapidly, pushed the eyeball forward to some extent, extended upwards on to the frontal bone, and was immovably connected to the skull. No headache or pain in the growth, which was of the size of a small apple. The operation which was undertaken for its removal was not completed; the tumour, which had penetrated into the cranial cavity, could not be separated away from the bone, and was only partly removed. Death followed after twenty-four hours, with the same symptoms as in the previous case. Post mortem: we found projecting into the anterior fossa of the skull a tumour the same size as that which was visible externally.

These two cases afford a further illustration of the importance of puncturing with a grooved needle in cases of orbital tumours, so as to be to some extent sure that the bony walls of the orbit still exist. It may certainly be urged against this proceeding that if the bones were destroyed serious consequences would ensue if the needle were passed into the brain substance. But no great danger results from such an injury—at least, I know that in tumours of the bones of the skull I have often been sure that I have punctured the brain substance with the needle, but no harm has followed. I can only remember one case in my experience, in which an abscess of the brain was found after examination with the grooved needle; here, however there was no proof that the two were related as cause and effect. The case was that of an old woman, who had a large carcinoma on the forehead. The ulcerated surface was punctured on several occasions, and a gap in the frontal bone, the size of a five-shilling piece, detected. On discovering this von Langenbeck declined to operate. Cerebral symptoms occurred and the patient died some time later.

The dura mater was found cancerous and thickened; at the apex of the left anterior lobe of the brain was an abscess, the size of a hen's egg, whose anterior wall was soldered to, and in part formed by, the dura mater. The abscess, therefore, might possibly have been caused by inflammation extending from the cancerous ulcer; at the same time, it must be admitted that it might have originated from the repeated needle punctures. Considering that this doubtful case is the only one which I can recall contra-indicating examination by the needle, it seems to me scarcely sufficient to cancel the great advantages of this method of examination. Cases do certainly occur in which recovery follows the removal of tumours, notwithstanding the opening of the cranial cavity, and in spite of the removal of the diseased degenerated dura mater. When such cases do occur, they may afford some consolation, but my experience does not encourage me to push operative surgery much further in this direction.

In the following case the result of examination with the needle induced me to undertake an operation which, from all other conditions, seemed to be almost hopeless.

Cylindro-sarcoma.

Frau C. S—, æt. 28, came under my treatment in December, 1870; she was a pallid brunette, of moderate stature, rather emaciated. In October, 1862, she first noticed a hard knot, the size of a pin's head, situated in the skin of the eyelid, near the middle of the right upper orbital edge. It increased gradually with pain, and in the course of a year had become the size of a pigeon's egg. The eyeball was displaced downwards and forwards, and the power of vision was somewhat impaired. When in this condition she was operated upon by Professor Balassa in Pesth. From the report of this surgeon, it appears that the tumour lay deep down in the orbit over the upper half of the bone, and was drawn forward and removed, together with the periosteum; the eyeball was preserved, although the power of vision and movement remaining in it was but little. A year later recurrence took place in and about the cicatrix; the growth of the tumour was this time slower, so that, up to the time when I saw her, it had taken six years to reach the size of a hen's egg. Severe pain occasionally occurred, extending over the whole forehead; the right eyeball was much displaced forwards and downwards; lateral movements were somewhat, vertical movements much, impaired. She could only count fingers at a distance of three feet. Some separate prominent nodules of the hardish irregular tumour were very painful. Examination with the needle showed that the tumour was everywhere firmly connected with the skull, and the bone offered resistance. It was found impossible during the operation to preserve the eyeball. A portion of bone had to be removed with the gouge from the upper border of the orbit, and a part of the

tumour was lifted out from the right frontal sinus, into which it had extended by pressure. The tumour, as had been diagnosed, proved to be a typical cylindroma. The patient recovered.

The following case is one of extraordinary interest in the following particulars:—(1) that after the operation, prolapsus cerebri took place into the orbit; (2) that this was complicated with aphasia and paresis of the opposite half of the body; and (3), most remarkable of all, that these conditions after a time disappeared, and the patient again recovered complete health.

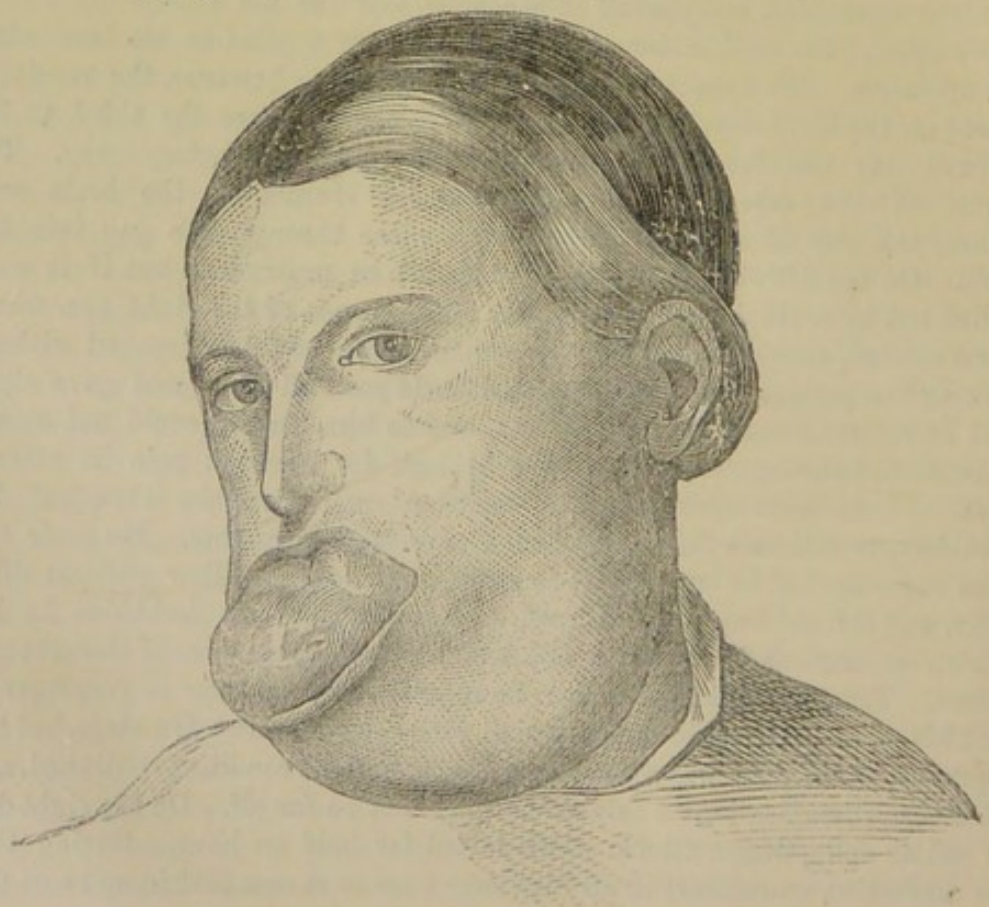
B. T—, æt. 47, had a superficial destructive ulceration of the left half of the nose and eyelids, extending into the orbit. This had commenced as a nodule, close to the inner angle of the left eye, eight years previously. During the operation, the entire orbit had to be scraped out with a raspatory, for everywhere suspicious nodules could be felt. The cancer for the most part was superficial, and the bones on exposal seemed to be free of disease. At one point, however, just above the lachrymal bone, a gap the size of a bean was seen. The diseased part was removed with great care and caution; after this was done the pulsations of the brain were distinctly seen at this spot. The brain seemed to be covered by roughened dura mater. The patient, who was much distressed by the long operation and the plastic procedure following it, had moderate fever during the next few days. He vomited repeatedly, complained of headache, and was not always quite clear in his mind. An ice-bladder was kept continually applied to his head after the operation. We expected suppurative meningitis; however, the vomiting ceased on the third day, and the pain diminished. From the third to the seventh day the fever diminished in the most satisfactory way. The sequel of the case was most remarkable. Hernia of the brain substance, the size of a small walnut, took place through the gap into the orbit. On the fifth day the tongue could not be protruded, but if it were pulled out he could draw it back again. The cornea of the right eye, which alone existed, possessed scarcely any sensation, and could be touched without making the patient blink. The patient could see and hear, and gave signs that he could understand whatever was said to him, but he could not speak Phonation, however, was not completely lost, for when in pain he uttered cries. If he were spoken to he waited a moment, then shrugged his shoulders, to intimate that he could not express his thoughts. He made the same movement if he were asked to write. He could swallow without difficulty, and refused any kind of food or drink which was forbidden by his Jewish co-religionists. He was dumb, but not without power of thought and reason. Thus, he made signs when he required the bed-pan or porringer to void his urine. He could stand up, and with support walk a few steps, but the right half of the body was weaker than the left. This condition continued, and we feared, therefore, that a fatal issue could not be far off. On the eight day he had an epileptiform attack, which lasted for half an hour. During this the convulsive movements in all his limbs were so severe that in spite of the

nurse's support he fell out of bed. On the fifteenth day after the operation undoubted symptoms of improvement first showed themselves, and quickly followed one after the other. The tongue could again be protruded, but for some day always was directed rather to the left. The first word which the patient was able to utter was "heiss;" then he commenced to write, and stated that he could not speak. On being asked why not, he only shrugged his shoulders. Gradually, however, speech returned, the weakness of the right side disappeared, and the cornea again became normally sensitive. By the twentieth day after operation the disturbance of the activity of the nerve system had disappeared. On the seventh day after operation febrile symptoms had disappeared, but he had a febricula remittens, with somewhat severe exacerbations, on the ninth, fifteenth, and sixteenth days. The prolapsed brain in great measure returned, though not completely. Later on, the orbit was covered in by a flap taken from the forehead, in order to prevent, as far as possible, any injury to the exposed part of the brain. Four months after admission he was discharged. The cancer recurred, and he died two years after the operation, twelve years after the commencement of the disease.

Central sarcoma of the lower jaw.

The tumour represented in the illustration occurred in a very anæmic girl, æt. 14, and had existed for four years. I sawed through the jaw near the right

FIG. 9.—CENTRAL SARCOMA OF THE LOWER JAW.

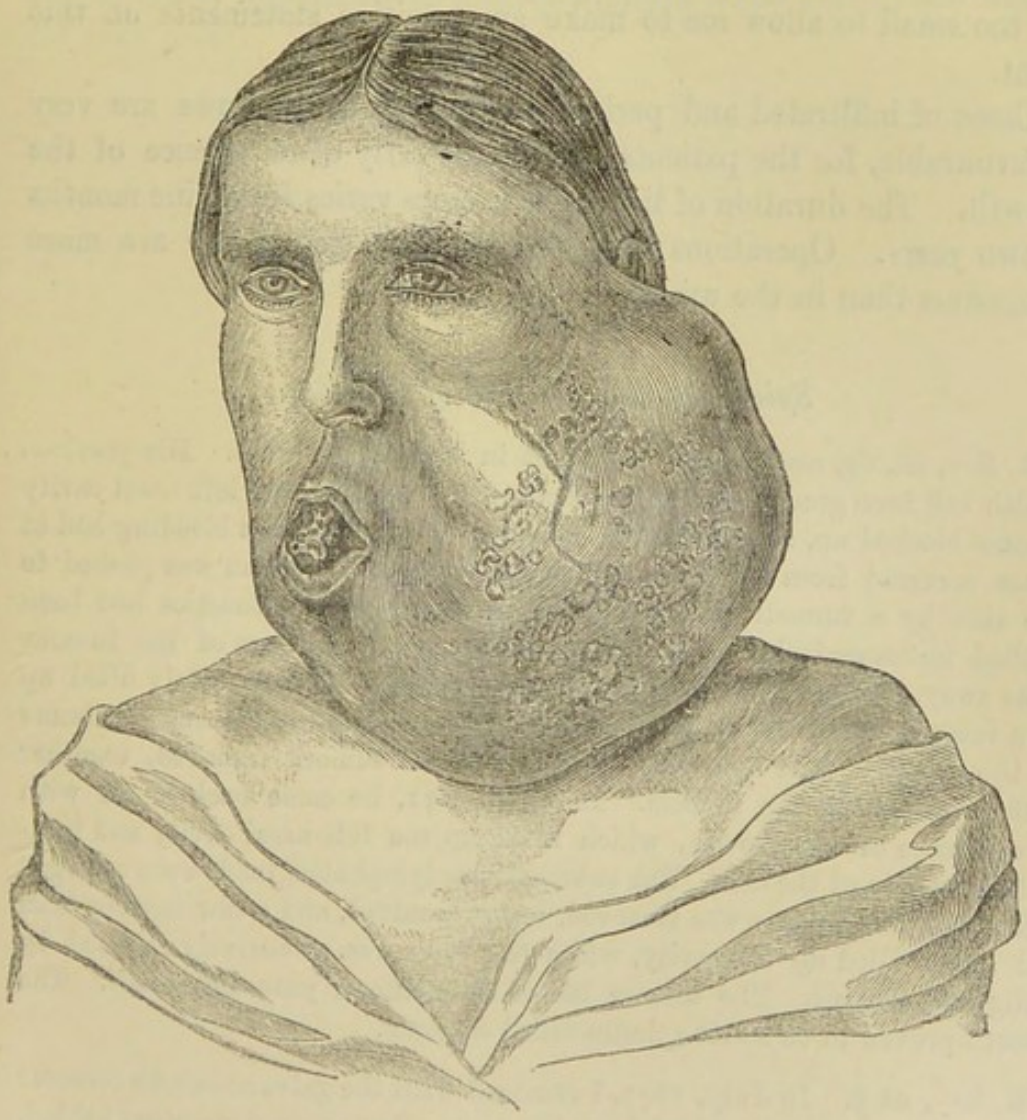


canine tooth, and disarticulated the bone on the left side. Death took place a few hours after the operation from exhaustion. This case is also described in v. Pitha and Billroth's 'Chirurg.,' Bd. ii, 2 Abth., p. 459.

Periosteal sarcoma of the lower jaw.

K. T—, æt. 26, had noticed for nine months a swelling near the left temporo-maxillary articulation. In the course of three months it had reached the size of a hen's egg. The tumour then began to increase with great rapidity, and spread over the whole of the lower jaw, reaching the size shown

FIG. 10.—PERIOSTEAL SARCOMA OF THE LOWER JAW.



in the illustration. The patient could not completely close her mouth, and was only able to swallow fluids; the respiration was quite free. After consultation with my colleague, v. Dumreicher, I decided against operation, as we felt sure the patient would have died from the hæmorrhage. The disarticulation must be rapidly accomplished in such cases or the hæmorrhage may prove fatal.

Tumours of the Lower and Upper Jaw.

It is interesting to compare the relative frequency of diseases occurring in the upper and lower jaw. In the upper jaw, cystic tumours are more common. Epulis-sarcoma occurs equally in both. The encapsuled form of central osteo-sarcoma is peculiar to the lower jaw. On the whole, the development of sarcoma is somewhat more common in the lower jaw, though not markedly so. My numbers are too small to allow me to make any positive statements on this point.

Cases of infiltrated and periosteal sarcoma of the jaws are very unfavourable, for the patients usually die early of recurrence of the growth. The duration of life in these cases varies from nine months to two years. Operations for sarcoma of the lower jaw are more dangerous than in the upper.

Spindle-celled sarcoma of the nose.

A. S—, æt. 63, came under treatment in November, 1870. His previous health had been good, but nine months before admission the left nasal cavity became blocked up, as if he had a bad cold. For six months bleeding had at times occurred from the nose, and the left half of the organ was pushed to one side by a tumour developing within the cavity. Caustics had been applied unsuccessfully. From time to time small portions of the tumour came away. When I saw him the left nasal cavity was completely filled up by a tumour, which had a pedunculated attachment to the mucous membrane of the septum. The nose was slit up and the tumour removed, together with a portion of the septum. In April, 1871, he came back to me with a recurrence of the growth, which filled up the left nasal cavity and infiltrated the skin of the nose. The submaxillary lymphatic glands were enlarged and soft. The tumour was removed, but it recurred, and a few months later had again filled up the cavity, while the neck was extensively invaded by malignant deposit. The disease lasted altogether a year and a half. The growth proved to be a soft spindle-celled sarcoma.

K. S—, æt 9. In July, 1877, I removed with the galvano-caustic écraseur some fibro-sarcomatous polypi from the nose. Some polypi remained behind, which were extracted a month later, after the nose had been previously slit up. Two months later osteoplastic resection of the upper jaw was found necessary, in order to remove some fresh growths. These were excised and the surface cauterised. Numerous tumours were found attached by broad bases, so that it was not possible to be certain at the operation whether all the small remnants adhering to the bone were removed. A few weeks after

the child was discharged new symptoms of recurrence took place, and the patient was readmitted in a state of dyspnœa, with the left side of the face enormously swollen and the eyeballs prominent. Resection of the upper jaw was performed, and the base of the tumour seared with the actual cautery. Eighteen months later he came back to me again, free from recurrence and in perfectly good health; inasmuch as the former recurrences had always taken place immediately after the operations, there seemed to be some hope that he might now be freed from these troubles. At any rate, there was manifestly no tendency to continuous recurrence.

Considering the fibro-sarcomatous character of these tumours, it was of course impossible to predict whether local recurrence might not take place.

CHAPTER VIII.

DISEASES AND INJURIES OF THE NECK.

Section A.—Miscellaneous.

Acute cellulitis. Case of cut-throat. Case of clonic spasm of sterno-mastoid muscle. Tumours:—Case of cavernous blood tumour; case of cavernous lymph tumour and varix lymphaticus. Case of congenital cyst. Case of serous cyst. Case of superficial ulcerated sarcoma. Case of stricture of the œsophagus—malignant, syphilitic, traumatic. Case of congenital diverticulum of the œsophagus. Case of branchial fistula. Case of syphilitic stricture of pharynx. Foreign bodies in the œsophagus—Cases. Foreign bodies in larynx—Cases. Cases of tubercular disease of larynx. Case of extirpation of larynx and bronchocele. Case of papillary cancer of the trachea; removal. Case of stricture of trachea. Case of cancer of thyroid and trachea; removal. Laryngotomy and tracheotomy in croup and in other diseased conditions.

A few cases of deep suppuration in the cellular tissue, occurring without known cause, came under treatment. The symptoms were very severe, and a long time elapsed before the abscess presented externally. In all the cases, as early as possible, careful dissecting incisions were carried down to the abscess. One man, thirty-three years old, died of septic fever with mediastinitis and pleuritis. A man, fifty-two years of age, died from sudden profuse hæmorrhage causing suffocation. The left superior thyroid artery, which lay on the wall of the abscess, was found to be ulcerated through. An opening also had formed in the left wall of the pharynx.

The cause and origin of these phlegmonous inflammations, most of which go on to suppuration, is by no means always clear. In one of my cases it was due to perichondritis of the larynx; in another I think acute parostitis about the angle of the lower jaw set

up by carious teeth, was the source of disease, which was unaccompanied by any suppuration of the periosteum proper.

These inflammations at times assume a diphtheritic character. It is with the diphtheritic nature of the process that I connect the almost stony hardness of the infiltrated tissues and the severity of the general symptoms; this view is further evidenced by the rapid collapse, great quickness of the pulse, complete suppuration and sloughing of the extensively infiltrated tissue, the slow healing, and tedious convalescence. In many cases these inflammations are parossal, originating in the neighbourhood of the vertebræ, and sometimes, also, they may be set up by acute infection of the deep lymphatic glands.

Cut-throat.

In one case, where a man had attempted suicide, the wound extended through the thyroid cartilage in such a way that the vocal cords were cut through. Partial necrosis of the cut edges of the cartilage followed, and the vocal cords shrank up completely. Although stenosis was prevented by the early introduction of large tubes, yet no power of speech was recovered. Dr. Gussenbauer, who gave the utmost attention to this patient, constructed an artificial larynx, which the patient, who was a man of some intelligence, learned to use to such good purpose that he could be distinctly understood at a distance of two rooms.

Clonic spasm of the sterno-mastoid muscle after a gunshot wound.

A. H—, æt. 42, had received a gunshot wound fourteen years previously; the bullet, which had entered close to the right ala of the nose, had broken off all the back teeth in the upper jaw, and had then been spat out in a flattened-out shape. Numerous necrosed fragments of bone separated subsequently, and recovery was very tedious. Seven years after the injury spasmodic twitchings commenced in the right sterno-mastoid. At first they occurred but occasionally, then became more frequent, and gradually extended over the whole right half of the face. When I saw the patient the spasms were almost incessant, and affected also, at times, the muscles of the throat During sleep they ceased. The patient had been treated by subcutaneous injections, and every kind of drug supposed to be of use in such cases, but without any benefit.

I examined repeatedly to see if I could find any deeply situated foreign body, such as a portion of the bullet, but never succeeded in doing so. At the request of the patient on two occasions I divided the right sterno-mastoid muscle subcutaneously, but no improvement resulted.

Cavernous blood tumour.

A tumour of this nature, the size of a large chestnut, was found in the subcutaneous cellular tissue of the inner edge of the sterno-mastoid muscle. The patient was fourteen years old, and the tumour had existed for four years. The growth was removed and recovery followed. Four large veins required ligature.

Cavernous lymph tumour.

J. P—, æt. 23, had noticed three years previously a swelling beneath the chin; this gradually increased without giving any pain, and on admission was the size of a hen's egg. A cystic growth was diagnosed. On cutting down, I came upon a thin-walled cyst; this was opened, and a little clear yellow serum escaped. Behind this lay another small cyst, which was readily emptied by pressure. I now came down upon some cavernous tissue, from which all the fluid soon ran out. The growth then so collapsed that much difficulty was experienced in removing it. The tissue, on the most careful examination, seemed in no way to differ from that of a cavernous blood cyst.

Varix lymphaticus.

A man, æt. 36, had had for many years a distinctly fluctuating tumour, the size of a hen's egg, in the posterior triangle of the neck. Some serous fluid was drawn off, containing only a few colourless blood-cells. Some iodine and water was injected, and the cyst shortly after shrank up completely.

Congenital cyst.

F. M—, æt. seven months, was stated by the surgeon who had attended him to have been born with a tumour, the size of an ostrich's egg, on the left side of his neck. Distinct fluctuation was evident in the swelling, which was very translucent. When two days old the cyst had been punctured, and a thin, yellow, serous fluid was let out. The skin over the tumour collapsed, together with the sac of the cyst, so as to form a wrinkled mass. Two months afterwards the cyst had again filled up to the size of an apple; it then shrank up again to the size of a walnut, although nothing was done to it. Six days before admission the tumour had again begun to grow, and the skin overlying it had become swollen and red. The patient was feverish. Suppuration was suspected, and some pus was let out through a puncture. As this treatment obviously could not have effected a cure, I laid open the anterior wall of the cyst. On introducing the finger I found several septa in the cavity; I broke through these without causing any bleeding, and could then pass my finger right back to the anterior surface of the vertebral column. Remarkably slight reaction followed this operation, and in a month the cavity had completely closed up.

Probably this was a case of congenital cystic hygroma. The child went on well, and when he came back to me, some time after, was well developed. The skin of the neck on the right side was rather wrinkled, but in other respects there was nothing abnormal to be seen. Behind the posterior edge of the sterno-mastoid the finger could be pushed in quite up to the vertebral column.

Serous cyst of the neck.

G. H—, æt. 30, was admitted in June, 1870. In March, 1869, he had suffered from pleurisy of the left side, which had confined him to bed for three months. Immediately after this he first noticed a soft painless tumour, the size of a hazel nut, above the left clavicle, which increased slowly but constantly. When he was admitted the cyst was of the circumference of a good sized apple, and fluctuated distinctly. The cyst was punctured, some pure serum escaped, and the sac then completely collapsed. I immediately injected some tincture of iodine, with an equal amount of water, and let the injection out again after ten minutes. Moderate reaction followed; absorption was very gradual; a year later we heard that the tumour had gradually disappeared entirely.

The case may have been one of lymphangioma or a lymph varix, possibly originating from compression of the thoracic duct by the pleuritic exudation.

Superficial ulcerated sarcoma.

A woman, æt. 53, found, when she was sixteen years old, a wood tick (*Ixodes ricinus*) in the skin over the subclavian triangle. This she drew out. A small nodule remained at the spot, which increased slowly but continually for thirty-seven years. The lymphatic glands in the neighbourhood were not enlarged. The tumour was removed, and three years later the patient was free from recurrence, and perfectly well.

Cancerous Stricture of the Œsophagus.

Most of these cases were treated by the introduction of bougies. In one case the cancer of the œsophagus was combined with an aneurism of the arch of the aorta. No internal cancerous deposits were found post mortem. Under some circumstances it may be just as difficult to introduce a sound through a stricture of the œsophagus as through a stricture of the urethra. In the former case, the patient may still be

able to swallow pulpy food just as in the latter he may still be able to pass the water in a tolerably large stream. Both strictures, therefore, may be permeable, and yet will not admit an instrument. In strictures of the œsophagus the difficulty may be due to the fact that the dilatation above the stricture is so considerable that the point of the bougie becomes lost in the sacculation, and so fails to hit on the point of constriction. If the stricture be caused by a tumour in the wall of the œsophagus, and this wall is felt to be hard and irregular, it is sometimes impossible to work through it by ordinary elastic sounds, or even the best made English instruments. In the case of an elderly gentleman who was only able to swallow pulpy food, but who could swallow this with tolerable ease, I was unable, like some other surgeons who had made attempts, to pass the ordinary instruments through the narrow part of the œsophagus, even after much trouble. I then had a long conical sound of lead made; with this I was easily able to pass through the stricture, merely allowing the instrument to find a way through by its own weight. The daily dilatation with the bougie for carcinomatous strictures is the only thing that we can do to preserve the unfortunate patient from death by starvation. I am certain, however, that this daily stretching and irritation of the carcinoma hastens its softening. I saw a case once, in Berlin, where a carcinoma of the œsophagus had made its way through into the left lower lobe of the lung, so that the patient, who was accustomed to pass an instrument every day for himself, thrust it into one of the bronchi. I know of another case where the bougie perforated the aorta. "Also vorsicht."

Cicatricial stricture of the œsophagus of syphilitic origin.

A man, æt. 55, had suffered for some months from catarrhal inflammation of the back of the throat, accompanied by much slimy discharge. Just behind the cricoid cartilage a small annular contracted area could be felt. Broad condylomata were seen about the angles of the mouth and the tongue. Deglutition was much interfered with. Under treatment for six weeks with the Decoctum Zittmanni and the use of bougies during six months, he completely recovered. I saw him two years after this, and he was then perfectly well.

The following case of traumatic stricture of the œsophagus is remarkable:

A man, æt. 25, of slight build, had a very tight stricture of the œsophagus,

the result of swallowing some caustic soda. It was only just possible to pass a small instrument through it. The instrument had been passed several times, and one morning went through so easily that I passed immediately after a thicker conical sound. This was introduced slowly, but not without some little pressure and difficulty: the patient suddenly complained of intense pain, whereupon the instrument was immediately withdrawn. The same day he became very feverish, and complained of piercing pains in his right side; the breathing too became very laborious, and pleurisy, with some effusion on the right side, was discovered. In the course of the next few days, the pleuritic effusion increased, the patient became collapsed, and died. Post mortem: pleurisy was found on the right side, as we had expected, and some mediastinitis at the back, but there was *no injury to any part of the œsophagus.*

The dilatation, although gradual, had evidently set up inflammation of the cellular tissue around the stricture, which by continuity of structure had extended to the pleura. This process was new to me in the case of the œsophagus, though I had occasionally seen it in the treatment of urethral strictures. My colleague, Rokitansky, who had the kindness to examine the preparation, and was able to convince himself that there was no laceration of the œsophagus, not even an abrasion of the mucous membrane, informed me that he had already seen similar cases; he suspected that, in consequence of the stretching of the cicatricial tissue of the stricture, some injurious matter had filtered through from the œsophagus into the mediastinal cellular tissue, and had there set up inflammation.

Traumatic stricture of the œsophagus.

M. L—, æt. 4, had a stricture of the œsophagus, resulting from swallowing some caustic soda five months previously. This was dilated by means of bougies, and the child became able to swallow its food with tolerable ease. She came to us with the history that she had been unable to swallow anything for twenty-four hours. A medical man had repeatedly endeavoured to introduce a bougie, but had been unable to get through the stricture.

The attempts had given the child much pain, and caused some bleeding. When admitted the patient was much collapsed, the temperature low, pulse scarcely perceptible, and the face cyanosed; the tissues of the neck emphysematous, and dyspnœa marked. We diagnosed perforation of the œsophagus and consequent inflammation of the deep cellular tissue of the neck. Tracheotomy was immediately performed, but the child died the same evening. The stricture was found afterwards to lie on a level with the cricoid cartilage. At this point there was a perforation of the œsophagus, leading into the posterior mediastinum, in which a cavity full of blood was found.

Congenital diverticulum on the left side of the œsophagus.

This case did not occur in my practice, and the only specimen that I know of which illustrates this very rare condition is a preparation presented to the Zürich Museum by Dr. Bühler, whose description I here append.

"The preparation was taken from a woman æt. 56, and shows a diverticulum of the œsophagus, about the size of a duck's egg. The history was not clear, but it seems that she had had a tumour on the left side of the neck for many years, which was subject to occasional enlargement. Some of the food used to enter this quasi-stomach, and would remain there for a considerable time. In order to render swallowing easier, and in part also to empty the sac, she was accustomed to make pressure externally. When she did this the food, altered by acid fermentation, regurgitated with a kind of retching and produced a most disagreeable taste. In this way she could make the tumour disappear. When full the sac caused some neuralgic pains by pressing on the brachial plexus: this she could relieve by squeezing out the contents."

The patient died of tubercular peritonitis. Dr. Bühler looked upon the affection as one of congenital origin.

With this view I must concur. The inlet of the diverticulum was about the size of a florin; the sac itself was formed of the mucous membrane and muscular coats of the œsophagus. The mucous membrane showed no trace of cicatrix. I could not clearly make out from the preparation the level at which the diverticulum opened into the œsophagus, but it must have about corresponded to that of the cricoid cartilage. Examination of the preparation led me to the conclusion that the diverticulum had been formed by the partial closing of one of the branchial fissures externally, while the internal opening had remained patent. I thought that this view had not been previously suggested, but I find a similar explanation in v. Bardeleben's surgery.

Branchial fistula.

Karl L—, æt. 18, had from his birth a small sinus connected with the pharynx on the right side of the hyoid bone. The opening was covered by membrane. If milk were injected into the sinus it passed down into the throat.[1]

[1] Full references to the literature of this subject will be found in a paper by Sir. J. Paget, in 'Med.-Chir. Trans.,' 1878, vol. lxi, p. 41. [Ed.]

Extensive cicatricial stricture of the pharynx of syphilitic origin.

A man, æt. 40, came to the hospital with respiration and deglutition much impeded. On opening the mouth a singular spectacle presented itself. The cavity behind the base of the tongue was shut off by a smooth diaphragm, in the centre of which was situated an opening of the diameter of a penholder; through this opening he breathed and took his food. The nares also appeared to be completely closed up at the back; evidently this remarkable condition had resulted from cicatrisation following ulceration of the inner edges of the velum and the dorsum of the tongue, which had become united together. It appeared that he had suffered for some three years from ulceration about the neck, and had been treated partly with Zittmann's decoction and partly with inunction and iodine. He left before any treatment could be adopted.

I had intended to dilate the opening by means of tubes, and subsequently to excise a portion of the cicatrix.

Foreign body in the œsophagus.

A man, æt. 56, had noticed for some time a tumour on the left side of his neck, accompanied by scratching sensations in swallowing. He was constantly clearing his throat, and spat up at times a little blood. Externally the growth seemed to be an abscess and was incised. A pointed, sharp, angular piece of bone, which had evidently been broken off, escaped. The abscess soon closed up.

The piece of bone had doubtless been swallowed and stuck fast in the œsophagus, which it had then perforated, and so made its way externally. From the shape of the bone it was evidently not a sequestrum from the vertebral column.

A child, æt. 1, accidentally swallowed a button three days before admission. It appeared that he had a stricture of the œsophagus, caused by eating some lye a year previously, which had been almost completely cured by dilatation. Not an atom of food could pass into the stomach after he swallowed the button, and even water, though slowly swallowed, regurgitated. The button was extracted by œsophagotomy, and the child soon recovered. (The case is reported in the 'Arch. f. Klin. Chirurg.,' Bd. xii, p. 678.)

A girl, æt. 7, had swallowed some sulphuric acid when she was eighteen months old. Since that time she had suffered from dysphagia, and the œsophagus had been frequently dilated with bougies. When admitted the child was very emaciated; she suffered from cough and occasionally spat up pus. She was very sensitive to the introduction of instruments, which sometimes passed quite easily, on other occasions met with much difficulty. The bougies passed very readily into the sacculations of the mucous membrane.

Although the child was able to swallow milk and soup in tolerably large quantities, she became more and more marasmic, and died two months after admission. Post mortem: extensive suppuration was found in the œsophagus which was much pouched and sacculated; in one of the pouches was fixed a glass bead the size of a small bean.

The child had never told us that she had swallowed a bead. It is remarkable that the sound never struck on the foreign body, and that the bead had not become loosened by the suppuration, and fallen into the stomach; in all probability the bead had always remained fixed in the stricture, and the sounds had found a way through by its side.

One remarkable case is recorded by Dr. C. Gussenbauer in the 'Med. Wochen.' for 1876, p. 20, in which a highly tuberculous man, thirty-four years of age, swallowed the half of a large bent table-knife, probably with suicidal intentions. The knife was extracted by œsophagotomy, but the patient died ten days after the operation of profuse suppuration from the cavity.

Foreign body in the larynx.

G. S.—, æt. 7, broke by accident a pane of glass; he had a metal trouser button in his mouth at the time; he was so startled by the crash that he swallowed the button. A short time after this he had great dyspnœa; this was somewhat diminished by vigorous slapping on the back. Emetics were given without benefit, and the respiration continued laborious and whistling. Four days after the accident he was brought to me. Under chloroform the trachea was opened through the conoid ligament; nothing escaped, nor could anything be felt below in the trachea. Above, caught in the left side of the larynx, a metallic body was felt. I bent a loop of wire into the shape of a hook, so as to draw down the substance. At my first attempt I touched it with this, but on trying again was unable to feel the button. Meanwhile the breathing had again become perfectly free. As soon as the child had recovered from the anæsthetic, he made repeated, apparently purposeless, swallowing movements, and then said "now it has gone down." I supposed now that the button had descended into the stomach, and, as a matter of fact, it was passed three days later. Doubtless, I had pushed it back from the larynx and the child had swallowed it. The wound of the larynx soon healed up and the child recovered perfectly. There was no impairment of function in the larynx.

Tuberculous infiltration of the upper part of the larynx.

A woman, æt. 36, tolerably well nourished, had suffered for some time from hoarseness, cough, and latterly from difficulty of breathing. A nodulated

infiltration existed about the upper opening of the larynx and above the false vocal cords. Opinions differed as to the nature of the growth, which was, however, proved to be of a tuberculous nature by the removal and microscopic examination of a small piece. I performed tracheotomy and left the canula in the trachea; then I laid open the pharynx completely from just above the edge of the thyroid cartilage, and removed the greater part of the infiltrated mass. The patient died, ten days after, of double pneumonia. Post mortem: some firm, partially calcified nodules were found to have been left in the larynx.

Tuberculous disease of larynx.

J. S.—, æt. 56, an ill-nourished man of slender frame, had suffered from hoarseness and a feeling of suffocation for four months. A laryngoscopic examination showed some red papillary growths on the vocal cords, extending down to the larynx. There seemed every probability that it was a case of carcinoma of the larynx. However, a portion of the growth, removed by Dr. Schrötter, seemed under the microscope to be a granulation papilloma, covered by a thick layer of epithelium. On account of increasing danger of suffocation, I split open the larynx and cleared out the whole of the diseased part. The reaction that followed was trifling. The dyspnœa ceased, and remarkable improvement followed for a time. Soon, however, wasting and diarrhœa set in, and the patient died. Post mortem: caseous infiltration of the apices of both lungs was discovered, with tubercular disease of the intestinal mucous membrane. Further examination of the growth removed had already proved the incorrectness of our diagnosis, and showed that the disease of the larynx was of a tubercular nature.

One case of laryngeal stenosis resulting from tuberculous ulceration was brought to me in a girl twenty-eight years of age; the dyspnœa, which was very great, was so relieved by the inhalation of lime water sprayed upon the part that no operation was found necessary.

Complete extirpation of the larynx, with removal of a small bronchocele.

A. R—, æt. 54, had suffered for about twelve months from constantly increasing hoarseness and cough, and for four months from dyspnœa. When admitted he was in an emaciated condition, somewhat cyanosed, and breathing with difficulty. Considerable catarrrhal inflammation of both lungs, with dulness over the apices, and a considerable amount of muco-purulent sputa. Over the centre of a rather long and slender neck was a movable bronchocele, the size of a hen's egg. The larynx felt very hard, and the anterior angle of the thyroid cartilage was filled up and rounded. From Prof. Schrötter's laryngoscopic report I extract the following:—

"Œdematous swelling over both arytenoids; the cavity of the larynx between the false vocal cords is completely filled with a faintly red uneven growth of triangular shape, covering up both true vocal cords and the glottis. If the mirror be much depressed a narrow slit can, on deep

inspiration, be seen between the masses, through which air can pass." In Nov. 1874, total removal of the larynx was performed. The bronchocele was easily shelled out and removed. Tracheotomy had not been previously performed and the trachea sank down rather deeply. The hæmorrhage was very slight. Although the wound did well and there was but little febrile reaction, yet the patient's dyspnœa increased, as he was unable to raise the sputa, and he died four days after the operation. Examination of the larynx after removal showed an extensively diffused cancerous growth spreading over the larynx, which had partially invaded the cartilages. Extensive broncho-pneumonia was found post mortem.

If I had to deal with another case of this nature, I should certainly commence by performing tracheotomy, then try by all means to improve the bronchitis before extirpating the larynx. In the above case there can be no question that, owing to the defective power of expiration after the removal of the larynx, the bronchitis ran on to broncho-pneumonia.[1]

Papillary cancer (?) of the trachea.—The following case is of special interest and importance, not only from its rarity, but also from the difficulty of diagnosis and the repeated operations performed for its relief.

Herr M. F—, æt. 42, came to me in September, 1876. He stated that since October, 1875, he had at times difficulty of breathing during exertion. In February, 1876, these troubles increased, and he had attacks almost of suffocation, together with some hæmoptysis. The patient was a short sturdy man of healthy appearance. Respiration was accompanied with a noise audible at some distance. He was quite unable to walk upstairs, owing to his shortness of breath; occasionally he had terrible distress from a feeling of impending suffocation. With the laryngoscope, deep down in the trachea, close above the bifurcation, a reddish floating growth was seen connected to the right wall of the trachea, and leaving only a small fissure free for respiration. After consultation with Professor Störk, I performed the following operation:—The anterior wall of the trachea, from the cricoid cartilage down to a little below the edge of the sternum, was exposed, the isthmus of the thyroid divided, and the vessels immediately ligatured. The entire trachea was then laid open longitudinally, and the edges held apart by sharp hooks.

It is always necessary in the trachea, as in the larynx, to lay open the tube freely. If the manipulation of instruments is to be conducted with certainty, or a small mirror introduced so as to obtain a view of the deeper parts, the whole region should be thoroughly exposed before the trachea is cut into.

[1] Another case of complete removal of the larynx is described by Dr. Gussenbauer in the 'Arch f. kl. Chir.,' Bd. xvii, p. 343.

I introduced my little finger rapidly down the trachea and could just reach a small tumour with the tip of it. With a long-handled, curved, sharp-edged spoon I was lucky enough to detach and draw out the tumour at the first attempt. The hæmorrhage from the trachea was not great and ceased spontaneously.

In case severe hæmorrhage had arisen I was provided with a thick elastic catheter, which I intended to introduce into the right bronchus, so as, at any rate, to enable the patient to breathe with the right lung until the hæmorrhage ceased.

On recovering from the anæsthetic, the patient was able to breathe perfectly freely, and there was no need to introduce a canula. The tracheal wound healed up in twelve days. Microscopical examination of the tumour, which was about the size of a bean, showed it be a highly vascular papilloma, formed of granulation tissue covered by a thick layer of epithelium. It was connected by a narrow pedicle to a part of one of the tracheal cartilages. I was inclined to fear that recurrence would take place, although experience does not show that papillomata deep down in the trachea are often the starting-points of carcinomata.

Three months later the difficulty of respiration again occurred, followed by tracheal catarrh and hoarseness. When he came back to me in June, 1877, paralysis of the right vocal cord was found, and some small reddish growths deep down in the trachea. We could only suppose that the paralysis was caused by some tumour, possibly an infiltrated lymphatic gland, which we could not feel, pressing upon the right recurrent nerve.

In July, 1877, I performed the same operation as on the previous occasion. Some difficulty was experienced in exposing the trachea, for the cicatrix was not easily separated. On introducing my finger I found that there was a considerable growth on the original site, but besides this the right side of the trachea at the level of the manubrium sterni was much compressed by a firm mass. A very long canula was left in the trachea; I felt certain now that the stenosis of the trachea and the dyspnœa were caused by cancerous infiltration of the deep glands; the prognosis, therefore, seemed to me devoid of hope. However, during the next few weeks the patient improved in a remarkably satisfactory way. We tried for a long time to find a form of tube through which the patient might breathe freely, and at the same time be able to raise the sputa. Finally, at Professor Störk's suggestion, a valvular apparatus was made, which was attached to the canula anteriorly, so that the patient could breathe freely and speak through the tube, without being perpetually compelled to keep his finger on the opening. A still further unlooked-for improvement took place, for the voice became perfectly clear and the paralysis of the vocal cords disappeared. After a time the voice became as strong and resonant as ever it was, so that as an orator he could have filled the largest room.

This result is difficult of explanation. The tumour, which had appeared at the right side of the neck, and was somewhat painful on

pressure, had vanished again two weeks later. Was it pushed on one side by the pressure of the tube, or did it really subside when the paralysis of the vocal cord began to disappear? I conceived it possible that the disease might be a rare form of syphilis, and with that idea applied mercurial ointment and gave iodides. How much this had to do with the improvement I am unable to say. In October, 1878, I heard with great pleasure that the patient was still perfectly well.

Stricture of trachea.

A very rare form of stricture of the trachea was met with in a strong and well-built woman, æt. 25, who ascribed the origin of her disease to catching severe cold three years previously while engaged in bleaching linen. Since that time she had been hoarse, constantly felt irritating sensations in the neck, and had much troublesome cough. The sputa had never been very copious, but in the summer time often contained blood. For the four months preceding admission the troubles had increased very considerably, especially since she had been compelled to work near a manufactory, the smoke of which frequently occasioned her severe attacks of suffocation. The patient was sent up to the hospital to have tracheotomy performed. When admitted the respirations were forty to the minute and there was much straining of the muscles of the neck. A loud harsh sound was heard in the trachea at each inspiration, somewhat sharper on expiration, as if the air then were forced through a narrow tunnel; this noise, which was sometimes of a faint hissing nature and sometimes more like a sigh, was uniformly audible over the entire lung. On percussion a normal note was yielded over all the chest. Frequently, the inspiration would be easy for a time, and would then be interrupted by a hoarse little cough; this occurred especially after exertion or moving about much, but did not entirely cease even when she lay quiet in bed; the heart sounds were natural, the second sound perhaps a little intensified; all other functions normal. The patient had had no children and denied any gonorrhœal or syphilitic infection.

Prof. Störk reported to me as follows about the case:

"Profuse secretion of pus is found in the naso-pharyngeal region; the entire roof of the pharynx is covered with pus; the mucous membrane about the infundibula pale, and covered also with pus. Examined from in front, swelling of the mucous membrane is found in the nasal cavity; no ulcers or cicatrices are anywhere visible. In the interior of the larynx, with the exception of catarrh, evidenced by a moderate amount of swelling, and here and there some purulent secretion, nothing abnormal is to be seen. Very deep down in the trachea is seen a stenosis, diaphragmatic in form, the clear space having about the diameter of a goose-quill. The dyspnœa is in nowise proportionate to the stenosis, for in strictures of the trachea of the diameter seen in this case it is not usual to find the breathing so materially obstructed.

I can only suppose, therefore, that below the visible contraction is another stenosis, and this deeper funnel-shaped stenosis may at a guess correspond to about the sixth or seventh ring of the trachea."

Prof. Störk considered the disease to be due to a kind of blennorrhœa, with induration, contraction, and thickening of the mucous membrane of the kind first minutely described by himself. From his experience he was of opinion that no material or lasting benefit would be derived from any operative proceeding. I determined, however, to undertake something in order to preserve the patient from death by suffocation.

With the assistance and sanction of Professor Störk, I proceeded as follows:—The patient was narcotised, and then the entire anterior surface of the trachea was exposed from the cricoid cartilage down to the sternal notch. This was then cut open longitudinally, and the edges were widely separated; the rings of the trachea were much calcified. I now introduced my little finger, and found a stricture at the exact spot described by Professor Störk. Through this, with some difficulty, I was able to introduce an elastic No. 12 catheter. I then discovered that it was not a ring-shaped stricture or a membranous diaphragm which caused the obstruction, but a uniform constriction which extended down for at least 2 centimètres, probably as far as the bifurcation. The opening of the constricted tube was too small to admit any of the tracheal canulæ we had at hand. Even if I had introduced such a one, the patient could not have stood it for any length of time, for any little plug of mucus would have sufficed to choke it up. Forcible stretching appeared to me a more dangerous proceeding than incision—the more so, that I could not be certain whether the contraction was only formed by thickening of the mucous membrane and the submucous tissue, or whether the cartilaginous part of the trachea did not participate in the stricture. I preferred, therefore, to introduce a probe-pointed knife with its cutting edge forwards, and carried it down for about an inch, so as to incise the tissues for about 2 millimètres. The hæmorrhage was trifling. I was able now to increase the dilatation by introducing my little finger, which I carried down as far as the bifurcation; I was thus able to convince myself that the constriction was only due to a considerable hypertrophy of the submucous tissue, for on the division of this and the mucous membrane, the edges gaped widely, and allowed dilatation. The tracheal rings, although very hard, were not constricted.

The patient was able to breathe much more freely after she recovered from the anæsthetic, but in the course of the next few days it was evident that there was some hindrance to respiration through the tube. This was evidently due to the fact that the tube did not reach down low enough to keep apart the lower portions of the trachea, which soon contracted again. I introduced, therefore, a somewhat longer tube, but the breathing was not entirely free until I had passed down to the right bronchus a conical-shaped tube, which at the upper part was equal in diameter to the normal trachea.

I hoped, however, to improve matters still more. During all this time (two months) all kinds of local and internal remedies had been employed which are supposed to be beneficial in blennorrhœa of the mucous membrane, such as inhalations, topical application of astringent solutions, the internal administration of copaiba, balsam of Peru, tannin, etc. No appreciable benefit, beyond, perhaps, a slight diminution in the secretion of pus, took place. Every time that attempts were made to shorten the tube, or to discontinue its use for a time, such formidable dyspnœa occurred that the long tracheal tube had again to be introduced at once; we gave up all idea of being able eventually to remove the tube entirely. Wishing, however, to enable the patient at least to speak, we introduced a tube with an opening at the bend, through which we supposed that the air would readily pass when the anterior opening of the tube was closed. To our surprise this was not found to be the case; the lower part of the larynx had, after the tracheotomy, become so much narrowed and filled up with prominent granulations that it was no longer permeable to the air; notwithstanding all our efforts we were unable to dilate this part of the larynx; ultimately the patient became wearied with the attempts and left the hospital wearing the tube, through which she could breathe well enough. By closing the opening for a moment or two with her finger, she was able to speak a few words intelligibly in a hoarse voice. I was unable to learn anything further about the case.

Extensive ulcerated carcinoma of the right half of the thyroid and trachea.

A Russian merchant, æt. 53, had suffered for three years from laryngeal catarrh, with constant hoarseness and dyspnœa. At an early stage of the disease paralysis of the vocal cord was found, probably from the tumour, which was deeply situated, pressing upon the right recurrent nerve. Laryngotomy had been performed, and a canula left in, through which the patient was able to breathe very well. The patient asserted that he noticed the development of a tumour in the right side of his neck a few weeks after the laryngotomy. For a time his condition remained tolerable, although the tumour increased to the size of a fist. Shortly before I saw him the dyspnœa again recurred, as the tumour had pushed to the left side and narrowed the trachea close to its entrance into the thorax, and the canula could not be kept *in situ*. The case seemed to me to be hopeless, and I could only advise morphia injections to relieve the pain and dyspnœa. Apart from the local trouble, the patient was in good condition, and begged that something might be done to give relief; he was willing to face any risk. The first idea which occurred to me, of introducing a long thin canula into the laryngotomy wound so as to pass it below the impediment, was not found practicable. The tube at once caused severe cough and hæmorrhage from the trachea, and the patient soon refused any further treatment of that sort. By the introduction of the tube, however, I had made out that the tumour went further down into the trachea. The patient insisted that there must be some means or other of giving him relief, for he felt himself otherwise in such good health. I have seldom met any one

with such implicit faith in the power of surgical art. I decided on the following operation :—An incision was made over the right side of the tumour, the capsule was split, and the whole mass of the tumour scooped out. As each separate part was exposed penghawar was immediately applied. The right wall of the trachea was completely destroyed, but we were now able to introduce a canula deeply down and leave it there. The hæmorrhage was considerable, but easily controlled. The patient was much relieved by this proceeding; the secretion from the wound was but slight; the penghawar came away in about three weeks' time, but even at that date some fresh formations were apparent in the deeper parts, and the relief could only have been of a very transitory nature.

I am under the impression that some such treatment might be of use in many bronchoceles where the capsule is too firmly connected to the surrounding parts to admit of complete extirpation. It seems that Kocher has adopted this plan for some time, and had satisfactory results from it.

Thirteen cases of laryngotomy and tracheotomy for laryngeal croup.

All these patients at the time of operation were almost in a state of asphyxia. Only one recovered. One case occurred in a woman between twenty and thirty years of age, the others in children from two to ten years old. Laryngotomy through the conoid ligament was always performed in the latter. In one case I was unfortunate enough to see the patient die of suffocation under my hands.

The patient was a strong child, æt. 6, on whom laryngotomy was performed for severe croup. The operation was of considerable difficulty, for the child had a short fat neck and a very large thyroid gland. The incision into the larynx was in consequence made partly through the thyroid cartilage, and the canula had a great tendency to fall out. Three hours after the operation I was called to the child again by the parents, as he was breathing very badly. Finding the canula half out, I determined to enlarge the wound downwards. With this object I placed the child on a table, close to the window of a very dark little room, and then carried a probe-pointed knife into the wound of the larynx. I had scarcely extended the incision for more than a line when a gush of blood welled up, which very quickly got into the trachea. I immediately introduced the canula, blew through it, and then attempted to secure the bleeding vessel with the forceps, but could not re-establish respiration.

This is the only case in which a patient has ever died immediately under the knife at my hands. It made a great and permanent

impression on my mind, and has been to me a most decided warning against ever attempting tracheotomy again when single-handed. If anybody had been with me to hold the child I could have cut down on the trachea below deliberately, and so avoided the bleeding. Nobody, however, except the parents, who were in a great state of perturbation, was present: the child had so much dyspnœa that I thought myself bound to act at once and alone, and thus met with this disaster.

A successful case occurred in a child four years of age.

I performed tracheotomy when the child was almost *in extremis*. The canula was first removed twenty days after the operation. The granulations of the wound in the neck were so prominent that they extended into the trachea and prevented me from removing the tube earlier, inasmuch as they half filled up the trachea and caused great dyspnœa. After repeatedly removing the granulations and applying caustics, I was able to dispense permanently with the canula; the opening then rapidly closed.

I think that the tracheotomies on children are the most difficult operations I have ever performed. The cases which I had at Zürich were commonly in small children with very short fat necks and enlarged thyroid glands. Not infrequently I found lying on the larynx such extensive and dense plexuses of veins that numerous vessels had to be secured before I could reach the conoid ligament; moreover, the children were, as a rule, only brought up to the hospital in the last stage of dyspnœa. In five or six cases the children were completely asphyxiated under the operation, but were brought round by artificial respiration. Judging from my experience I am unable to understand how many surgeons talk of laryngotomy for croup as a very simple affair. I should blame no surgeon who declined to perform this operation. It is often one of great difficulty, and we are the more bound to acknowledge the highly creditable fact there is no inconsiderable number of surgeons who practise it. But yet it may be the means of directly saving life. Thus, Dr. Reiffer, of Frauenfeld, records that in his country practice he has performed tracheotomy in eighteen cases of croup, and that eight children have recovered; truly a brilliant result. Such figures as these we should bear in mind, so as not to be dissuaded from this operation, even should we for periods of years meet only with unsuccessful cases. The patient is much better off in tracheotomy, as in herniotomy, when the surgeon, under whose treatment he is, selects the right moment for operation; far better

that he should do this than that after long resistance the patient should, at a late—often too late—a stage be brought up to the hospital. To us professors in the surgical clinics these cases come usually too late.

Laryngotomy and Tracheotomy.

In twenty-two cases one or other of these operations was performed for high degrees of asphyxia of some duration. In six only did the operation preserve life, yet all the patients were able to breathe with perfect freedom directly after the introduction of the tube, and there seemed no reason why they should not have recovered. Death occurred from a few hours at the earliest to three days at the latest after the operation, and started apparently from the respiratory organs; the patients breathed with more and more difficulty, became cyanosed, and then rapidly collapsed and died.

In no instance were any direct material obstructions to the breathing found in the lungs. The autopsies revealed little more than insignificant globular infiltration or slight atelectasis, from choking of the small bronchi by the tough mucus, with perhaps some old emphysema (especially in strumous subjects) or chronic bronchial catarrh. The post-mortem appearances did not explain the rapidly fatal issue of many cases. When, however, symptoms of asphyxia rapidly supervene on a laryngeal or tracheal stenosis which has existed for some days, and especially in those who have suffered perhaps for years from difficult respiration and imperfect oxygenation of the blood, it can be readily understood that a *restitutio ad integrum* of the respiratory chemical changes can no more be accomplished by the enfeebled apparatus. For in such cases the blood is overloaded with carbonic acid and other waste products. From the therapeutical point of view, these sad cases have given me much concern; possibly the same unknown causes are fatal also in diphtheritic inflammation of the air passages; yet in the latter we find—sometimes at any rate—that the morbid processes extend deeper down into the lungs. Moreover, we have learned that the diphtheritic process which primarily affects the air passages has some special injurious effect on the nerve system, and induces also rapid breaking down of the muscular tissue of the heart. Cases, therefore, having a sudden fatal termination

from failure of the heart can be to some extent explained on anatomical and physiological grounds.

Of the twenty-two cases mentioned above, in thirteen tracheotomy was performed for œdema of the glottis, originating from various causes; one was a case of fracture of the laryngeal cartilages, and in eight laryngotomy was performed for great dyspnœa, the result of bronchocele.

Tracheotomy was performed also in eighteen cases of croup, with two recoveries; one of these patients died of inanition a few weeks after the canula was removed. These cases were met with between 1860 and 1876.

Section B.—Diseases of the Lymphatic Glands.

Simple enlargements—Operative treatment. Chronic lymphadenitis and lymphoma. Medullary lymphoma and lympho-sarcoma. Case of primary (?) epithelial cancer of glands.

Of 145 cases of simple hyperplastic suppurating and caseating glands, 87 occurred between the ages of eleven and twenty. The preponderating frequency with which the disease occurs at this period of life is very striking. Formerly I thought that the so-called strumous enlarged glands were especially common in children, and were connected with the second dentition. This, however, can have no great influence, for the permanent teeth have mostly made their appearance when the patients have entered their second decennium. The prognosis in this complaint is, for many reasons, an unfavourable one; in the first place, we must confess that we possess no specific to bring about resorption of the simplest, purely hyperplastic, glandular enlargements. Still less do we know of any remedy which can obviate caseation or suppuration. Many of these swellings come and go without its being possible to assign any reason, either for the one or the other process. In one case, cold douches; in another, iodides; in a third, the use of mineral or salt-water baths; in yet others, strapping is said to have caused improvement or recovery. At times startling cures result from these remedies. Yet the surgeon should not be blamed if he frequently fails to achieve anything of the sort. I do not

say that the regulation remedies are absolutely worthless, but no one of them can be counted on with any degree of certainty. Nothing whatever can be expected from internal remedies. As consulting surgeons, we, as a rule, have no knowledge as to whether the dietetic rules recommended by us to be observed for periods of months or years are carried out.

Who would venture to guarantee with any certainty that he could prevent the occurrence of suppuration in a swollen gland? Speaking generally, it is true that diseases of the lymphatic glands mostly occur deuteropathically and reflect the primary disease. From acute suppurative or diphtheritic inflammations of the skin and cellular tissue result acute suppurative or diphtheritic perilymphangitis, perilymphadenitis, and lymphadenitis. Chronic hyperplastic inflammations of the nature of elephantiasis are the precursors of similar changes in the lymphatic glands. Chronic suppurating, ulcerative, and caseating changes in the superficial membranes cause suppurative and caseating lymphadenitis. If, for example, the primarily affected areas in the lungs go on to degeneration and calcification, the same process occurs in a deuteropathically infiltrated lymphatic gland; inasmuch, however, as the primary diseases occurring on the head and face which lead to swelling of the lymphatic glands are of a transient nature, they do not usually come under our observation, and we have then to deal with the enlargements of the lymphatic glands as producers, in themselves, of further disease. Their prodncts are the means of infecting other glands, and so the process goes on. There is a peculiarity in the suppuration which so frequently occurs in the glands; the change is seldom brought about by the softening and suppuration of the first hyperplastic formations: more commonly these products first caseate, pus forms around these caseous areas, and then enters into them, so that these same caseous deposits appear to go on to suppuration. Probably a chronic condition of irritation around the capsule of the gland is excited and kept up by the caseating matter, which is with difficulty got rid of; this condition, which at the outset leads to plastic changes and defective growth, eventually brings about ulcerative softening in the vicinity of the glands.

I have never seen calcification of the cervical lymphatic glands. They either remain in a dry, so-called tubercular condition, or else suppurate and slough, sometimes after months or years of quiescence. I cannot say whether from these caseous glands general tubercu-

losis may be set up. No satisfactory instance of it has occurred under my observation. In all the cases in which I saw tubercular disease of the lungs or intestines in connection with these suppurating glands, my impression was that the condition was due as much to hereditary predisposition as to the lymphatic glands; the latter, indeed, seemed to me to occur half accidentally as the first symptom of the tubercular diathesis. From my experience, which I freely confess is but small, I would venture to assert that amongst the numerous cases of tubercular disease of the intestines or lungs there were but few who had at the same time any sinuses about the neck or cicatrices; far more frequently are these sinuses or cicatrices found in those affected with caries.

If these caseating areas are once formed in enlarged cervical glands, my opinion is that they will not be absorbed. Such glands can be recognised by their hardness, fixity, and by their gradual coalescence. At such a stage, no doubt, some contraction of the hyperplastic tissue surrounding the caseous area may take place, diminution in size may follow, but no complete disappearance can be looked for. Again, it is true that the glands may remain for years unaltered when in this condition; further infection then but seldom ensues. Any severe congestion about the glands, caused perhaps by a blow or a fall, or originating without any known cause, can again awake into activity the irritating material stored up in the glands. Then the surrounding parts become inflamed, soften, and suppurate, an ulcerated cavity forms after they break, and the caseous masses are discharged. Even then a long time may elapse before the hard capsules of the glands shrink up completely and the sinuses close. It is no uncommon thing to see such changes, going on slowly for ten years or more, eventually leaving numerous unsightly cicatrices. Not infrequently the patients, especially when young girls, pine away both physically and mentally. The process wears them out, and even if they do not die early, all their enjoyment of life is embittered, and at times permanently destroyed.

It is more disagreeable for the surgeon to give a highly uncertain prognosis than to find his treatment powerless; the one alternative affects his reputation with the public far more than the other. On the whole, mistakes in prognosis will be less infrequently made if the disease be predicted as likely to last many years.

In the therapeutical treatment, the progress of time has found us all much more active; no one who has removed many such glands,

and has convinced himself, as he probably will do, that more than 75 per cent. of them contain caseous deposits, is likely to be deceived as to the possibility of such glands becoming absorbed, nor will he imagine that they can disappear without leaving cicatrices. Bearing this in mind, the surgeon will more readily counsel operation to these patients. Of course, cases where other tubercular processes of the internal organs have been already diagnosed must be excluded. A further reason for advising operation is that such a proceeding is very rarely attended with any risk, and that the resulting cicatrices are, as a rule, less disfiguring than when the process is allowed to run its own course.

Two different forms of operative measures may be adopted.

1. The sinuses may be enlarged superficially with the knife, and the deeper parts with sponge or laminaria tents; then the thinned ulcerated edges of the skin can be cut away, and the cavities scraped out with a sharp spoon, or else the surface of the wound may be destroyed with nitric acid, caustic potash, or liquor ferri, and the part left to heal up. I have adopted methods of this nature, modifying them according to circumstances, in many cases, and have had good reason to be satisfied with the results. One patient alone died of pyæmia after this treatment. The thickened capsules of the glands which are connected to the surrounding parts are commonly left behind; on their capacity for shrinking up, and on the yielding of the surrounding parts, the rapidity of recovery depends. It need hardly be said that these operations, which are often rather formidable, are contra-indicated if the patients be in a low state. Cases will be met with in which the capsules of the glands and the parts immediately around them are so indurated that months may elapse before the sinus will close; sometimes remnants of the gland tissue remain behind, which then caseate, and materially delay recovery. The operation then has to be partially repeated. I must further remark that the surgeon should proceed boldly in scraping out and cutting away the ulcerated edges of the skin; the more the latter are spared the more ugly is the scar; thinned skin, ulcerated on its inner surface and overlying caseous and softened deposits, should always be removed. I have always regretted it, when I have only scraped out the ulcerated surface below and have allowed such tissue to remain. If by good luck suppuration did not occur, yet the deeper part of the cicatrix became so prominent that the subsequent scar had a very unsightly appearance.

2. All the glands that can be got at may be removed, together with their capsules. It need hardly be pointed out that caution is necessary in such operations; they are simple and easy of performance when the capsules are not too firmly united to the surrounding parts, and can be detached without cutting. Such operations, however, may cause anxiety to the most experienced surgeon, as he proceeds step by step with his knife, the more so if he is working in close proximity to the large vessels of the neck; moreover, they may become very formidable by their long duration and loss of blood. I have never lost a patient from collapse, but I have often had occasion, owing to the weakness of the patient, to break off and complete the operation on a subsequent occasion. If the glands were enlarged on both sides, I always removed each set separately. I almost invariably make my incision along the anterior or posterior edge of the sterno-mastoid muscle. By extending this incision longitudinally sufficient space can always be obtained. In removing glands in this way, the operator will often find himself in close proximity to the internal jugular vein; this vessel is much more easily displaced by the glands than the carotid artery or the vagus nerve; its wall, too, more readily becomes connected to the capsules of the glands than the sheaths of the arteries and nerves. In four cases I divided the internal jugular vein between a double ligature, and no untoward results followed. Secondary hæmorrhage, however, often followed in cases where a small puncture had been made through the wall of the vein and the side of the vessel secured, or where branches of the veins less than a centimètre in length were tied. I consider myself very fortunate only to have lost one patient from secondary hæmorrhage of this nature. In operations about the cervical glands, as well as in dealing with those in the axilla, I make it a rule, if any small puncture be made in the wall of a vein or if short branches be wounded, always to expose the vessels thoroughly and divide them between a double ligature. I consider such a proceeding far less dangerous than the apparently less severe plan of ligaturing the side of the vein. The latter method sometimes succeeds, but often the adhesion gives way, and the short thrombus becomes detached; hæmorrhage then occurs, tampons have to be applied, and extensive thrombosis—with possibly serious consequences—is the result. I have never seen any injurious disturbance to the circulation result from ligature of the jugular vein.

I may further remark, that in extirpating glands, together with the parts immediately around them, behind the border of the lower jaw, a branch of the facial nerve, lying deep in front of the internal maxillary artery, may be met with and divided. This branch supplies the muscles of the lower lip up to the red edge; if the nerve be cut through the lip curls inwards, and cannot be turned out, as for instance, in laughing or smiling. At first this state of things occasions a good deal of disfigurement, but after a time the condition improves: in some cases it entirely disappears. I am unable to say whether this latter result always takes place, but from my experience of the results after division of other small branches of the facial nerve, I think it is highly probable. If these operations be performed carefully and without much injury to the surrounding parts, if the hæmorrhage be completely controlled, the wound drained, and well-applied pressure made, the whole part may heal up by first intention. If the glands have been completely removed the patients are, in many instances, entirely relieved of their trouble in a week or two. Good results like this are not so very uncommon, and are highly satisfactory when contrasted with the ordinary methods of treatment. It may of course happen that portions of the capsules of the glands or of the caseous deposits may escape notice or be purposely left behind, for fear of going too far; under such circumstances certainly sinuses will be left, which may suppurate for a long time, and require subsequently to be treated by the ordinary means. Unfortunately, too, many cases occur in which other glands subsequently become affected, and fresh operation may be necessary, if the patient be not in a hectic state. Finally, there are cases in which on one or both sides hard caseous glands extend from the ear to the clavicle; unless such patients are of very strong constitution, which is very seldom the case, the magnitude of the operation may preclude the idea of any surgical interference. In spite of all this I can only—speaking generally—advise extirpation of the cervical lymphatic glands, inasmuch as our other means of treating these diseases are, as has been already said, far too ineffective.

Of ninety-four cases operated on, I lost three; one from secondary hæmorrhage, one from erysipelas, and one from pyæmia. Of nine patients, in whom parenchymatous injections had been employed with different kinds of fluid during considerable periods, two died of erysipelas. In dealing with small statistics, accidental causes

have a very important influence, and I think it hardly worth while to estimate the percentage of mortality from the figures at my command.

Chronic Lymphadenitis and Lymphoma. (Z. B.)

In no other organs is there so much difficulty in distinguishing minutely between chronic inflammation and tumour formations as in the lymphatic glands. In the earlier stages, swellings of the lymphatic glands all resemble each other. Histologically, the swelling is invariably found to be due to simple hyperplasia. At a later stage, in the great majority of cases, this hyperplasia leads to caseation and suppuration, which changes may either start from infection originating in the areas of inflammation, or else may be idiopathic. In either case there is more or less tendency to ulceration and perforation of the skin, and the formation of the so-called "strumous" glandular ulcers.

Forms consequently occur where the hyperplasia, remaining as such, and without any retrograde metamorphoses, continually and slowly progresses, until the whole tissue of the gland becomes and remains uniform in structure (simple lymphoma or scrofulous glandular sarcoma). Now, if this process should be arrested in its progress, caseation will sometimes occur in the later stages of these tumours. Next come the quickly growing softening lymphomata, which, on dissection, seems to have the appearance of the medullary formation. Among these we may still find pure hyperplastic forms, which, although on minute investigation, may prove to be spindle-celled sarcoma, yet often to the naked eye occur under the guise of the so-called "tumor-fasciculatus," *i. e.* a growth where the fibrous material can be torn into bundles like muscle. Finally, we come to tumours of the lymphatic glands originating secondarily—secondary sarcoma, chondroma, carcinoma, etc.

The primary lymphatic glandular tumours come first under consideration.

In a lymphatic gland caseous metamorphosis following chronic inflammation can only be distinguished from simple hyperplasia, if the gland be softened, and fluctuation evident, or if pus has already made its way out externally. Multiple glandular swellings of slow and continuous growth, which coalesce without altering in

consistence, may usually be looked upon as simple hyperplasia. Such cases, however progress so slowly that they are seldom kept under observation in hospital to the end of the disease. One of the most marked features of the scrofulous diathesis lies in the great proneness to inflammation of the lymphatic system. I entirely agree with Virchow in his views on this matter, when he states that in nearly all cases some peripheral irritation gives rise to these lymphatic swellings (I would rather say some infection coming from without to a lymphatic gland). He argues that the peculiarity of the scrofulous diathesis consists in this: that these formative irritations do not cease when the source of irritation is removed—*i.e.* when the peripheral area from which the irritation originates recovers itself—but that the hyperplasia which has been once started in the lymphatic glands is then able by itself to extend more and more. I wish only to add to this that there are some individuals in whom such irritation leads to a continuous uniformly extending new formation (simple lymphoma) and that there are others in whom the hyperplastic formation soon becomes caseous, or breaks down and suppurates. This is tantamount to saying that etiologically the simple lymphoma and the caseous suppurative and ulcerated lymphadenitis have essentially the same causes of origin.

In these lymphatic swellings, then, which are recorded in my tables, cases only were entered which could be looked upon as idiopathic, and in which, at the time that the patients were under treatment, there was no disease in the neighbourhood of the face or head. In a few cases investigations were made as to whether the affection of the lymphatic glands had been preceded by some other disease, which might possibly have given rise to the lymphoma. I find noted that the lymphatic swellings were preceded in two cases by periostitis and caries of the upper jaw, in two by impetigo capitis, in several cases by inflammation of the eye, once by pneumonia, two by erysipelas of the face, once by angina, once by acute rheumatism, and in one instance the lymphatic glands were swollen, together with the thyroid gland. With regard to this last case it should be observed that lymphatic gland swellings do not accompany the ordinary common form of bronchocele, which I may mention in passing is somewhat remarkable.

Since attempts have gained ground to refer lymphatic swellings, which formerly were classified as idiopathic, as little as possible to accidental causes, we have repeatedly heard that there are

two dentition periods which produce glandular swellings. Thee enlargements, attract little notice in the majority of cases; in scrofulous children they are marked and become permanent, owing, as it is supposed, to some local qualitative want of power to resist irritative disturbances. It is certainly worth while for the profession to continue their etiological investigations in this direction, but for the hospital surgeon the difficulties are in this, as in other etiological investigations, very great; for the most part we have to depend on the unreliable statements of patients who are usually uneducated. As to the age at which, among our patients, lymphatic swellings originate, I have some tolerably clear data. The small glandular swellings which come under observation in children from one to five years old mostly prove to be acute or subacute abscesses. It would be, however, premature did we attempt to infer from this that the first period of dentition may not give rise to chronic lymphoma, for our observations did not extend to the out-patients, and no children were admitted simply for swollen cervical glands. Lymphatic swellings in children of rather more advanced age were not usually referred back by the parents to the period of the first dentition: this I may point out is due to the fact that the lymphatic swellings at that age more commonly disappear or else terminate in acute abscess; in general, all the symptoms accompanying the first period of dentition have a more acute character than those of the second period.

Out of fifty-seven cases fifteen occurred during the second period of dentition. The influence of the wisdom teeth on the disease is an open question. In none of the cases was there syphilis; in one case only was the hypertrophy of the lymphatic glands in the neck, accompanied by enlargement of the spleen without any increase of the white corpuscles of the blood. The patient died of marasmus and anæmia. Post mortem, we found an enormously hypertrophied spleen, and commencing cirrhosis of the liver; in the blood of the splenic veins were many spindle cells (endothelium of the vein); the other organs were normal. The whole process had lasted one year.

Whatever ideas be entertained as to the etiology of lymphoma, two general conclusions are beyond dispute—(1) the lymphatic glands are almost invariably affected secondarily; (2) excepting the mesentery, there is no region of the body where the lymphatic glands are so often swollen as in the neck. Now, for this there must be reasons, and these reasons ought to be discovered. Perhaps we do

not always inquire carefully enough whether exanthemata, especially measles and scarlet fever, immediately preceded the commencement of the glandular swellings; both are accompanied very often with such intense catarrh in the neighbourhood of the face and head that a very evident source of lymphatic swelling is thereby occasioned. Further, caries of the teeth with the alveolar periostitis which so frequently accompanies it, is certainly in many cases the original cause of the lymphatic swellings. I have tried repeatedly to learn what happened to these patients later on, and whether they were affected with new diseases of the lymphatic system, such as leukæmia, anæmia, diseases of the spleen, etc., or whether they died of tuberculosis of the lungs. It would be very important to gain knowledge on such points, but it was so difficult, often impossible, to get any reliable information, that I soon got wearied at the unproductive results of my inquiries about the subsequent diseases of these patients.

In the treatment of these diseases I have scarcely seen any good result from iodine, cod-liver oil or iron; external application of iodine, too, seems to have absolutely no effect, in whatever form it be applied. However, I prescribe it frequently, for I know nothing better to prescribe. Compression, as advocated by my esteemed teacher Baum, sometimes brought about slight diminution of the glandular tumours, at other times led to softening and suppuration. On the whole, I have come round to the opinion that the simplest plan of treatment is either to destroy or to extirpate the glands. This method of treatment would seem to be still more worthy of recommendation if the modern views as to the origin of tuberculosis should prove true—viz. that every caseous area, especially if it exist in the lymphatic gland, may prove to be a source of danger. Extirpation of the cervical lymphatic glands may be very easy, or it may be very difficult. It is always practicable when the capsules of the glands are not too much adherent together or united to the surrounding parts, and when the glands are not too much softened. If in the latter condition, they cannot be completely removed, and sinuses are left, which take a long time to heal. In removing lymphatic glands the knife should only be employed till the capsule of the gland is exposed, and then the tumour should be turned out with the finger or with blunt instruments. The large vessels passing in at the hilus should be ligatured before they are cut through. These operations may extend down to the sheaths of the deep vessels and nerves of the

neck, but the reaction is, as a rule, moderate and recovery rapid; certainly in most cases the patients are youthful. Of twenty-seven cases in which I extirpated the glands in this way I did not lose a single patient. One of my cases was a simple multiple lymphoma on both sides of the neck, in a girl eighteen years of age. If the removal of the glands is not possible, we are then limited to the application of caustics, or incision and scraping out of the caseous matter, methods which will usually prove ultimately successful, if other conditions be favourable, though often not for months or years. These manipulations are often rendered very troublesome by the situation of the swellings, as, for instance, when the sinuses run deep under the sterno-mastoid muscle. Cauterisation with caustic potash or chloride of zinc arrowheads are the most potent remedies. If it is necessary to penetrate very deeply these remedies should not be employed too boldly, for fear of damaging the carotid artery or jugular vein. Stick caustic is less dangerous. Caseous lymphatic swellings and sinuses may form in old people,[1] but it is not advisable to be too bold in laying these open or removing the swelling. I saw one old man die after this operation, although he seemed to be by no means particularly feeble. No operation should be risked which will entail febrile reaction in those who have tuberculosis of the lungs, or a predisposition thereunto. In such cases local interference must be avoided as much as possible, for it would not only be futile, but dangerous. Those who object to the extirpation of lymphomata assert that these operations are fruitless, inasmuch as fresh glands always become affected subsequently; this view is not, however, in all cases accurate. In my tables a list of cases will be found where the patients were known to be in good health some years after the operation, and that, too, in cases in which several glands had been extirpated.

In six cases of rapidly growing soft lymphomata the exhibition of arsenic was employed, on three occasions with remarkable success. In one of these patients the lymphoma had affected the cervical, axillary, cubital, and inguinal glands on both sides, as well as those of the mesentery. The arsenical treatment was attended with great success for the time, but I have no later information about the patient. Of the other two cases, one occurred in a man with lymphomata in both sides of the neck, both axillæ, and who had at the same time a large mediastinal tumour; the other was a unilateral

[1] Cf. Sir. J. Paget on "Senile Scrofula," 'Clin. Essays' 1st, Ed. p. 344.

tumour of the neck in a child; in three instances the arsenical treatment led to no good results. These were all cases where soft rapidly growing tumours occurred separately in different parts of the body, and did not coalesce with one another (malignant lymphoma). Such cases are usually associated with pallor, but not commonly with leucocythemia; there is simple hyperplasia of the gland. Death commonly follows from hydræmia, marasmus, and dropsy. In all the cases (seven) the disease commenced below thirty years of age.

Simple ordinary lymphoma (W. B., 1870).—In three patients I tried parenchymatous injections of the tumours. Solutions of chloride of gold, carbolic acid, quinine, iodine, etc., were the drugs employed. In all the cases the effects so far resembled each other that no direct shrinking of the growth nor absorption was caused by the employment of these drugs, but repeated injections were invariably followed by small abscesses. The tumour then shrank up to some extent, whether the pus was let out or escaped spontaneously. No material diminution, however, was brought about. After we had employed injections made in different ways and of various strengths, we finally abandoned the method of treatment. Other surgeons have met with rather better success. But I may remark that among the many cases in which I have extirpated lymphoma in Vienna, I have very seldom met with simple hyperplastic, unaltered forms of the growth. The glands are nearly always completely caseous, and frequently softened; even the smallest glands are found in this condition. Now, even in simple hyperplasia of the glands, there is but little hope of resorption; and such a result can scarcely be expected when the glands are completely caseous. The mesenteric and bronchial glands have a far greater tendency to shrink up, calcify, and degenerate than the cervical, axillary, or inguinal glands. The latter groups are much more prone, generally speaking, to softening. The early occurrence of caseation in lymphomata, explains to my mind why compression is so ineffective.[1]

Medullary Lymphoma and Lympho-sarcoma.

Histologically we are justified in distinguishing between these

[1] Remarks on these tumours will be found in 'Arch. f. Kl. Chir.,' Bd. xviii, p. 98, 'Wien. Med. Jahrbuch,' 1877, Heft iii, p. 153, and 'Wien. Med. Woch.,' 1877, No. 1.

two forms of morbid growth, though it is by no means easy to do so. From a clinical point of view such a separation, so far as my acquaintance with the two forms of disease extends, would be of little value. In early stages, and when they first originate, no distinction can be made between the two forms of glandular enlargement. After they have grown for some time unnoticed, they begin rapidly to increase; the separate nodules coalesce, the whole mass of the tumour becomes adherent to the deeper parts surrounding the lower jaw, extending back to the vertebral column, and displacing or even becoming united to the larynx. In the meantime the skin over the tumour has turned red and thin; the tumour is in parts so soft, as to yield a sense of fluctuation, though it contains no fluid. In this state it may remain for a few weeks. If the growth be extirpated at this period the tumour on section will resemble in consistence the white matter of the brain. In some parts it will be semi-solid, in other parts separable into bundles, like those of muscle or the fasciculi of coagulated fibrin (carcinoma fasciculatum of Rokitansky[1]); the individual glands can scarcely be differentiated one from another in the uniform mass. The tumour is certainly surrounded completely by a capsule of cellular tissue, but the separate capsules investing the glands will have disappeared and become lost in the mass of the growth. Microscopically, no structure can be found, while in freshly-cut portions of the tumour only lymph-cells, with here and there a few spindle-cells and fine bundles of cellular tissue will be recognised. If thin sections of preparations, hardened in chromic acid or alcohol, be pencilled over or shaken up, a fine network of fibres bearing a rich capillary plexus, similar to that found in the alveoli of the lymphatic glands, may be recognised, in the meshes of which the lymph-cells are contained. The mor narrow the meshes of the net are, the more does the structure of the lymphoma approach to that of the granulation sarcoma (glioma of Virchow); not infrequently, indeed, two forms may be united together in the lymphoma. The thicker the fibrous reticulation, the larger the spaces, the more does the network resemble the stroma of a cancer. This means of distinction led me to characterise the following case as one of medullary lymphoma:

H. K—, æt. 30, had noticed for thirteen months glandular swelling on the right side of his neck. In the course of a year the tumours had increased, without pain, to the size of a fœtal head. In removing the growth the pneumo-

[1] 'Billr. Path.,' Hackley's Trans., p. 618.

gastric nerve was found to pass right through the middle of the tumour, and a portion of the nerve, one inch in length, was inadvertently cut away. The internal jugular vein was wounded and the carotid artery laid bare for a considerable distance. The patient was discharged in six weeks with the wound almost healed. By means of the laryngoscope paralysis of the right vocal cord was detected. Two months later the patient came back to the hospital with a recurrence of the growth, which had again reached the size of a fœtal head, and become ulcerated. No operation was possible and the patient died shortly afterwards of hæmorrhage. The disease had lasted altogether seventeen months. The patient had in early youth suffered from glandular swellings, which had in great measure disappeared before the new growth originated.

Medullary lymphoma may occur at any age, and seems to be rather more common in men than women. I have seen a morbid growth of this nature in a child one year old, and quite recently a case where a man, sixty years of age, had a similar tumour in the axillary glands. Whether permanent cure may follow from early and complete removal of these tumours must for the present be undecided. From the examinations I have made it is clear to me that not only the capsules of the glands, but the adjacent cellular tissue also, become infiltrated by a small-celled growth and converted into lymphoma. According to this view, complete extirpation would only be possible if a portion of the apparently healthy tissue immediately around was removed together with the tumour, which in the neck is not practicable. Many of the recurrences are certainly local, *i.e.* glands which at the time of operation had not become affected and are left, become subsequently the seats of fresh morbid growth.

Medullary lymphoma.

Frau P—, æt. 36, was a well-nourished, healthy-looking woman, whose previous health had been good. About two years before I saw her she suffered from a painful carious tooth on the right side of the lower jaw. In consequence of this, swelling of the lymphatic glands below the edge of the jaw occurred. At first the swelling increased very slowly, but after a few months more rapidly, occasionally causing some pain. When she came to me, the tumour was the size of a goose-egg, immovably connected to the bone, and extending but little into the mouth; the tonsils were not affected. The whole of the right half of the lower jaw was removed; the condyle and the coronoid process were left. The tumour was very carefully extirpated, so that no visible trace of it remained. Unfortunately very rapid recurrence took place, and she died two months after the operation.

J. G—, æt. 37, a brewer, had noticed, for six months, some swelling partly

in the neck and partly behind the right angle of the jaw. This had been preceded for some time by singing noises in the ear. For two months the growth had been increasing very rapidly in the neck, and caused difficulty of swallowing and breathing. The tumour filled up the right side of the cavity of the pharynx up to the velum, and extended from that point to the lower and back part of the angle of the jaw, at which latter point it bulged forward prominently. Operation appeared to me to be unadvisable. With a view to cause some shrinking of the growth a solution of carbolic acid (two grains to six drachms of water) was injected into the tumour at six different points; moderate reaction followed. Three days later the injection was repeated. The growth constantly enlarged, and four days after the last operation the difficulty of respiration was so great that laryngotomy was performed. Fluctuation was then distinct, both externally and internally. Severally incisions were made and some foul sanious pus evacuated. The growth shrank up so much subsequently that in three weeks the canula was removed and the patient could breathe freely through his larynx. He died four months later. The disease had lasted about a year.

Primary epithelial cancer of glands.

A man, æt. 58, had a deep-seated epithelial cancer of the lymphatic glands on both sides of the neck. No peripheral disease could be clearly proved. The tumour was removed six months after it was first noticed. The internal jugular vein had to be ligatured. He died five days after the operation of septic fever (infectionsfieber).

Section C.—Diseases of the Thyroid Body.

Various forms of bronchocele—Clinical and pathological characteristics. Cases of bronchocele treated by puncture—by injection of iodine—(remarks on 20 cases)—by chloride of zinc paste—by subcutaneous laceration—by tenotomy of sterno-mastoid—by extirpation (remarks on 18 cases). Three cases of extirpation of bronchocele. Case of cyst bursting into pharynx. Cases of cyst treated by injection and incision. Cases of malignant bronchocele. Cases of abscess in thyroid. Case of bronchocele during pregnancy; tracheotomy. General remarks on treatment of bronchocele by iodine injections. Cases of softening of bronchocele.

In connection with these cases, which will only be considered at present from an operative point of view, I must premise the

following observations:—We have to distinguish—(1) The diffused, commonly bilateral hypertrophies which are vulgarly termed "thick neck" (Dicke Hals). This affection is infinitely common, without giving rise to any serious trouble. Such cases require no operative treatment. In young persons they can be improved at their commencement by energetic treatment by iodine, but can seldom be dispersed entirely. (2) Bronchoceles which are circumscribed glandular hypertrophies, tuberous adenoma or cysto-adenoma; these may occur singly, but are often multiple. The rest of the thyroid gland may be perfectly normal, though it is usually rather hypertrophied. (3) Pure cystic bronchocele. (4) Carcinoma of the thyroid—"struma carcinomatosa." There is no need to employ a special term for the so-called "struma aneurismatica."[1] In nearly all the multiple tumours of the thyroid which have existed for some time, the supplying arteries are much dilated.

Cystic bronchocele.—There is usually little difficulty in recognising a pure primary cystic bronchocele if the tumour is of any size and pushes forward prominently. By primary cystic bronchoceles I mean those which are composed of a single smooth-lined sac, secreting usually a dull yellow or brownish fluid of viscid consistence. They are developed by hyper-secretion in the separate vesicles of the thyroid gland, which then coalesce: sometimes they form in a single vesicle. They may attain the size of a man's head, and though not infrequently on one side, usually lie in the middle line of the neck. There are other kinds of cystic bronchoceles with contents similar to the foregoing, which have a rough lining, and originate in the parenchymatous gland tissue. These cysts develop by mucoid softening in the swollen parenchymatous tissue; in addition to this softening a central process of contraction is common enough in bronchoceles. The walls of the cysts may calcify. It is often a matter of great difficulty to diagnose cysts formed by softening. A puncture with an exploring trocar is often needed in order to clear up the diagnosis, for when the bronchocele is very soft and the capsule tense, the feeling of fluctuation cannot be distinguished from that of a cyst containing fluid. The puncture in such cases does not always let out much fluid, for these cyst walls have frequently but little elasticity. More rarely in parenchymatous bronchoceles it happens that the whole substance becomes

[1] 'Billr. Path.,' Hackley's Trans., p. 639.

converted into a greyish, granular, thick pulp. If these tumours be examined after death, on cutting into the mass a firm sac with pulpy contents will be found, which during life, would have given the impression of being a solid growth. The pulpy matter is usually calcified in part; this form of bronchocele may, perhaps, be diagnosed when neither blood nor fluid escapes, after the exploratory puncture. These are by no means the only metamorphoses of tumours of the thyroid, which originate in the parenchyma; for purposes of diagnosis, however, and with regard to operative interference, they seem to be the most important changes.

That the simple evacuation of the fluid by puncture is nearly always but a palliative measure might be inferred by analogy from the puncture of cysts in other regions. This method is, however, not very advisable in cystic bronchoceles for severe inflammation may follow, as in the following case:

C. K—, æt. 25, had a large hypertrophied thyroid. In the middle line of his neck was a distinctly fluctuating tumour, the size of a hen's egg. Considerable dyspnœa had gradually developed. The central tumour was punctured, and some brownish fluid and blood let out. The tumour did not properly collapse. A cyst with central softening was diagnosed. Severe inflammation followed; a sinus formed in connection with the cyst; gradually the enlargement disappeared under the application of ice; the breathing again was free, and he left with the sinus still discharging. Six weeks later he came back with enlargement of the growth, and much dyspnœa. The central portion of the tumour was removed and proved to be a cysto-adenoma.

J. S—, æt. 30, had, on the right side, a hard bronchocele, the size of a goose-egg. He had considerable dyspnœa, aggravated by some tracheal catarrh. The tumour was punctured, some chocolate-coloured fluid evacuated, and the dyspnœa immediately improved. The bronchocele, however, did not collapse, and at the posterior part was hard. During the next few days the dyspnœa again increased; the puncture was repeated, and a canula left in, however without benefit, as the dyspnœa increased, until asphyxia threatened. A large incision was then made, and the edges of the cyst were united by sutures to the skin. The cyst contained some puriform fluid, and at the posterior part the wall was calcified. Improvement soon took place, and the patient completely recovered. The calcified masses probably dissolved; at any rate, nothing of them was found in the secretion. The patient's neck became again quite slender.

After these two cases I ceased to employ puncture as a palliative measure, and have always laid open or removed these softening

cysts. Puncture with an exploring trocar so as to let out a few drops of the fluid is not a dangerous proceeding. The puncture of parenchymatous bronchoceles if carefully conducted, does not, as a rule, lead to any inflammation of the thyroid. In one case of a single large cyst in a man, æt. 32, the cyst was punctured and a drainage tube left in. Moderate reaction followed. When the patient came under my care he had a fistulous opening which, by repeated injections of iodine, we succeeded at last in closing, six months after the original operation.

Another patient, an old man, in whom ten years previously a small incision had been made into a thyroid cyst by my predecessor, came back to the hospital on account of some slight injury. He still had a fistulous opening leading into the cyst; but little secretion, however, came from it, and he would not allow of any treatment. In ten cases the method of v. Bruns and v. Chelius Jun was adopted, *i.e.* the cyst was laid open and its edges united to the skin. On three occasions this was performed as a secondary measure, on patients in a feverish condition (case of J. S—,supra). Two other cases died, one of pyæmia twenty-nine days after the operation, while the other, who had been nearly asphyxiated by the growth, died of septicæmia.

Puncture and injection of iodine.—After puncture half an ounce of Tinct. Iodi. Fort. (one dram of iodine dissolved in ether to one ounce of absolute alcohol), was injected and left in, and then a collodion bandage[1] was placed on the anterior half of the neck. While at Zürich I had twenty such cases. Fifteen of these were in women and girls, from twelve to twenty-nine years of age, and five in men and boys, from twelve to thirty-two. In all instances the thyroid cyst, which so far as could be judged was simple, was permanently cured. In many of these patients diffused hypertrophy of the thyroid, or parenchymatous bronchoceles existed at the same time. In many instances the bronchoceles were completely covered by the cysts, which at times were as large as a man's head. I mention this, because it is interesting and important to know that the coexistence of hypertrophied thyroid and solid bronchoceles does not contra-indicate the puncture of the cyst and the injection of iodine. Unfortunately, however, the treatment of the cyst has

[1] *I.e.* strips of gauze of a finger's breadth soaked in collodion, a form of bandage much employed in some parts of Germany—[Ed.]

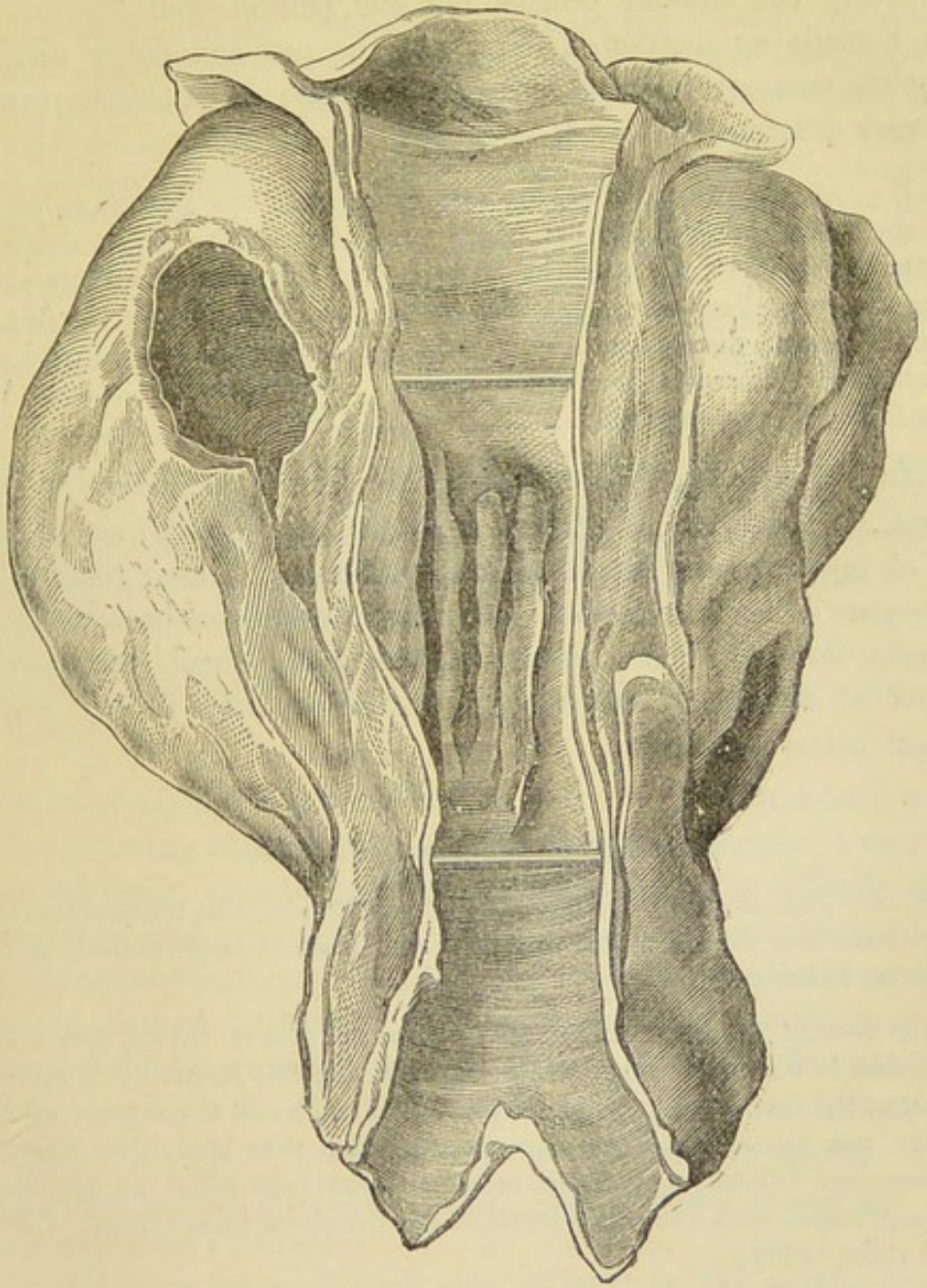
no influence on the disappearance of the remaining portion of the tumour. It sometimes happens that after the operation hæmorrhage occurs into the cyst, evidenced by rapid swelling. In one instance the cyst became so swollen that it was larger than before the puncture I put on a collodion bandage thicker than usual, and applied ice. Recovery was somewhat delayed but no other harm happened. With regard to the after-treatment, when iodine has been injected, it should be observed that sharp fever usually follows the operation. Iodism may occur, so that the patients have to lay up for a few days. The collodion bandage is most effective against the swelling, and I have seldom had occasion to apply ice. Gas often develops in these cysts after operation; no harm comes of it and it is best not to let it out; some months may elapse before the effusion, and the gaseous contents of the sac are absorbed. Matters will not be expedited by making any fresh punctures, as I experienced. In two cases where I punctured under these conditions, severe inflammation set in with dyspnœa and fever, and I had to lay open the cyst and unite the walls by sutures to the skin, and though both patients recovered, they had been exposed needlessly to a second operation and a new source of danger.[1]

In a case of parenchymatous bronchocele, associated with smaller cysts, occurring in a decrepid woman, fifty-nine years of age, I applied chloride of zinc paste. On both sides were large thyroid tumours, causing dyspnœa. The skin was incised on the right side where the larger tumour lay, and strips of lint soaked in chloride of zinc paste applied. On the following day the cauterised part was scraped away, and the paste reapplied. The dyspnœa gradually increased, until the patient become asphyxiated. Post mortem: the trachea was found narrowed, and the bronchocele had in part extended into it. (See Fig. 11).

Three cases of subcutaneous laceration of parenchymatous bronchoceles.—I have repeatedly observed, that in cases where at different times several punctures had been made into parenchymatous bronchoceles, in order to determine the consistence of the mass, dyspnœa was relieved and sometimes, as it appeared to me, the tumour diminished in size. Examinations of a considerable number of bronchoceles of this nature showed me further that not infrequently, a central cicatricial contraction took place. This gave me the idea

[1] For further remarks on the treatment by iodine injections, vide infra pp. 170—175.

FIG. 11.—BRONCHOCELE, EXTENDING INTO, AND NARROWING THE TRACHEA.



that it might be possible, in cases where extirpation would have been out of the question, to procure a process of shrinking, by repeated subcutaneous punctures; at any rate, I thought that I could make the tumour soften, and so change a solid into a cystic growth. I carried this idea into effect in the case of a phlegmatic young woman, æt. 32, who had a lateral, deep-seated, firm bronchocele, causing some dyspnœa. I thrust into it a moderate sized trocar, drew out the stilet and moved the canula about in different directions in the tumour; this brought about no reaction, so that I

repeated the proceeding several times, at intervals of a few days. Eventually the tumour became hot and painful, and fluctuated; then I made an incision, and let out the pus and pulpy matter. Complete recovery followed. In another case, however, the result was very different.

A. B—, æt. 37, had a fluctuating soft bronchocele the size of an apple, close above the sternum, and extending a little beneath it. Great dyspnœa and tracheal catarrh, with attacks of asphyxia. Subcutaneous dilaceration was performed. Very severe swelling of the tumour followed; the skin of the neck became discoloured and brown; the dyspnœa increased, and she was attacked with septic fever and delirium. I extirpated the tumour, but death followed from septicæmia.

This last case has rather deterred me from this method, which at first, seemed to me to promise good results. I have long had an idea of injecting very small quantities of much diluted tincture of iodine, or other substances, into parenchymatous bronchoceles; hitherto, however, I have never tried this plan; chiefly because the results of completely removing bronchoceles have in my hands become better and better.

Tenotomy of the sterno-mastoid.

Frau S—, æt. 26, had a bronchocele of the right side, with tracheal stenosis. The muscle was divided subcutaneously and marked improvement of the breathing followed.

Herr V—, æt. 17, had a considerable substernal cyst on the left side. The whole muscle was cut through completely, and the left sterno-hyoid muscle, as well as the fascia of the neck, partially divided, until the capsule of the tumour was exposed, a large skin wound being thus made; no material improvement followed, and death occurred some days after the operation, from septicæmia with duodenal ulceration and intestinal hæmorrhage. ('Zür. Ber.,' 1860—1867.)

Extirpation of bronchoceles.

In eighteen cases, while I was at Zürich, primary extirpation was undertaken for tumours of greater or less size, which may be arranged as follows:—(*a*) Bronchoceles causing little or no dyspnœa, and exclusively lying in the middle line of the neck, over the upper border of the sternum. (*b*) Bronchoceles, mostly unilateral, partly substernal, in which the symptoms of dyspnœa threatened to produce asphyxiation. Of ten such cases, four recovered and six died.

F. B—, æt. 23, had severe dyspnœa. Laryngoscopic examinations showed that the trachea was considerably pressed to the left, and the cavity of the tube narrowed internally. The tumour was scarcely noticeable. By making an incision on the left side of the trachea, I was able to draw forward a bronchocele the size of a hen's egg with immediate relief to the respiration. The day after the operation, râles were heard in the trachea, and the dyspnœa again increased markedly. Tracheotomy was performed and the breathing again became free. Everything went on well for a week after the operation, when rapid collapse occurred and he died rather suddenly. The canula was not stopped up. Post-mortem examination showed only extensive capillary bronchitis. The neighbourhood of the wound and the mediastinal cellular tissue were not infiltrated, nor was there any thrombosis of the vein.

U. B—, æt. 29, had a sub-sternal tumour in the middle line, the size of an apple, causing formidable dyspnœa, attacks of suffocation at night, loss of sleep, and great distress. The growth was removed; hæmorrhage occurred again after he recovered from the anæsthetic, and a tampon soaked in sesquichloride of iron was applied. As this brought on the difficulty of breathing again, the tampon had to be removed on the day following. The bleeding recurred, and the liquor ferri was again applied. Gangrene of the trachea followed, and he died of septicæmia, and mediastinitis, four days after the operation.

On carefully reviewing the results of my experience, I have come to the following conclusions with regard to the operative treatment of bronchocele. Simple primary thyroid cysts may be radically cured by puncture and injection of iodine; this is the most sure, and the least dangerous method. Cysts of this description may be recognised by their distinct fluctuation, and the cholesterine contained in the evacuated fluid. In secondary or softening cysts, the fluctuation is seldom very distinct. The fluid escapes slowly; that which flows last is mixed with blood, and the walls do not collapse much. Such cysts were treated by incision, but the operation is scarcely less dangerous than extirpation.

Bronchoceles, even of large size, situated in the middle line of the neck, and causing little or no dyspnœa, can usually be removed successfully, especially in women and girls. Much less favourable in its results is the operation for completely removing deep-seated substernal or unilateral bronchoceles, accompanied by a high degree of dyspnœa; even in cases in which the operation is immediately successful in saving life, the ultimate result is frequently unfavourable.

I have occupied myself a great deal with the question as to why some bronchoceles cause so much dyspnœa, while others, perhaps of

much larger size, entail none. This materially depends on the situation of the tumour; if the enlargement occurs in the lower part of the lobes of the thyroid and pushes forward against the unyielding sternum and first rib, compression of the trachea follows and dyspnœa is produced. Bronchoceles seated laterally at a somewhat higher level, frequently cause dyspnœa at their commencement; later, however, when they bulge forwards between the fibres of the fascia and the anterior (seldom the posterior) edge of the sterno-mastoid, the dyspnœa again disappears. Cysts, as well as parenchymatous bronchoceles may—according to their situation—cause dyspnœa. In such cases the division of the sterno-mastoid has but little effect. The deep-seated substernal bronchcoceles, which are the most dangerous of all, are not interfered with by the sterno-mastoid muscle but by the sternum. In deep-seated bronchoceles the dyspnœa is more marked in the male sex; probably owing to the fact that the fascia and muscles of the neck are more rigid, and that the tumour is therefore prevented from extending anteriorly.

The complete removal of a bronchocele is a simple matter, but requires a good deal of care and attention in its performance. Every bronchocele is encapsuled; the capsule is merely connected to the parenchyma of the gland and the surrounding parts by very loose cellular tissue and blood-vessels. The incision has to be carried through this capsule, and sometimes extended into the gland substance. If the surgeon has not had a good deal of experience of this operation, he may easily detach the whole mass of the thyroid, instead of merely the bronchocele, thus rendering the operation far more complicated and dangerous. The tumour must be separated cautiously with the fingers, care being taken not to lacerate the parts or to tear the growth away too forcibly, as the veins and arteries passing into the bronchocele are very thin and readily ruptured. It is a matter of no little difficulty and danger to secure these vessels when they extend far back into the parenchyma of the gland or deep under the sternum. No vessel ought to be cut through until it has been previously ligatured or secured on the proximal side. As soon as the capsule of the tumour is distinctly exposed, the knife and scissors must be laid aside. If the growth be ligatured *en masse* the threads should be drawn together as tightly as possible, otherwise the ends of the vessels will escape from the knots. Liquor ferri should not be employed to check bleeding in these cases, as it attacks the car-

tilages of the trachea. If more than ligature and acupressure be required, ice or pressure will control the bleeding. Subcutaneous laceration of bronchoceles, which are firm and solid in consistence, may be with caution employed further, but in soft parenchymatous goitres, which bleed freely on puncture, this method should be entirely rejected.

Large prominent bronchoceles in people above forty years of age, with slight or no dyspnœa, should not be operated on just for the sake of appearance. I think that small bronchoceles connected to the lower part of the thyroid in children and young people should be more often removed, especially when their situation is such that the tumour might, with the increased growth, possibly entail some danger. ('Zür. Ber.,' 1860—1867.)

J. K—, æt. 45. The bronchocele had originated six years previously on the right side of the neck; the tumour which was the size of the fist had pushed the trachea and carotid artery very much on one side; the breathing was difficult, and he suffered constantly from tracheal catarrh. The entire right half of the thyroid gland was removed. Death three days later from septicæmia.

In two other cases tumours in the middle line of the neck—one the size of a walnut, the other of a goose-egg—were successfully removed. ('Wien. Ber.,' 1869-70.)

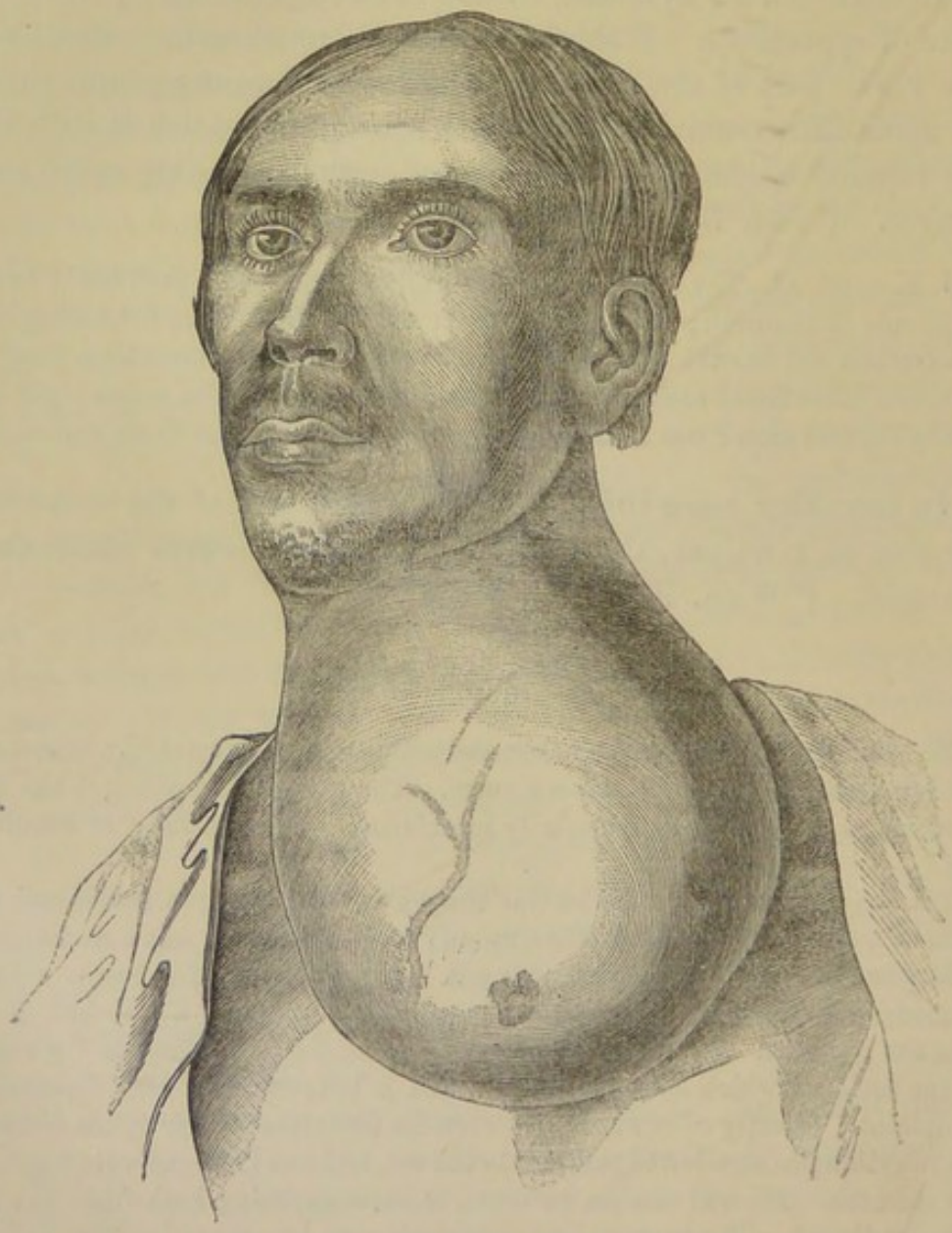
Cyst of the thyroid body.

M—, æt. 40, had noticed the slow and painless development of a tumour on the left side of his neck for fifteen years. The growth had attained the size of a child's head, without materially interfering with breathing or swallowing.

Ten days before admission, he was thrown out of a waggon, and struck the tumour a severe blow against the ground; immediately he felt a quantity of fluid pass into the throat, and spat it out. The fluid was of a brown colour. Thereupon, the tumour in the neck disappeared; evidently a cyst had burst into the pharynx. The patient was at first exceedingly rejoiced at the result of the accident which had apparently cured a long-existing and disfiguring complaint. Shortly afterwards, however, he discovered to his great distress, that anything he swallowed passed into the sac, and but little made its way into the stomach. He was unable, however, to press anything back from the sac into the throat. The tumour in consequence soon became as large as before, and as the respiration was impeded, a medical man punctured the tumour with a trochar and let out the fluid. The fluid, according to the patient's account, principally collected in the cyst after drinking. He was able to swallow sop and broth, but could not say whether the food passed into the stomach. When admitted he was in a very weak state; to restore his strength in some measure

injections of wine and eggs were passed down through a stomach tube. The tumour increased in circumference and at the time of operation it was the same size as before the accident. At the upper half it was resonant on percussion. Neither air nor fluid could be emptied out of the sac into the pharynx. A kind of valve had evidently been formed when the cyst was ruptured, the result of which was that substances could enter the sac from

FIG. 12.—CYSTIC BRONCHOCELE, WHICH BURST INTO THE PHARYNX.



the pharynx but would not return. The only thing to do therefore was to lay open the whole sac and the skin overlying it, and to unite the wall of the cyst to the skin. The contents of the sac were found to be thin and of a brownish colour; the gas had no ill smell. The inner surface of the cyst was rough; at the upper part an opening just admitting the index finger led into

the pharynx. We were now prepared to find it necessary to feed the patient through the tube, but to our no little astonishment, the patient was able to swallow fluid, without the escape of a single drop through the cyst. It appeared that the edges of the opening into the pharynx had become so displaced on the collapse of the cyst, that the action of the valve was completely reversed. Extensive breaking down of the inner surface of the cyst wall took place, followed by hæmorrhage from the deep parts, and he died of pyæmia. Post mortem, the diagnosis was confirmed; the opening into the pharynx was about the level of the cricoid cartilage, but it was so contracted that it would scarcely admit the point of the little finger. The opening in the cyst wall, and that in the mucous membrane of the pharynx, formed the orifices of a canal about three lines in length, which ran obliquely upwards. Probably the walls of this canal were so pressed together, when the muscles of deglutition contracted, that no fluid was able to get through.

Herr X—, a man about 60 years of age, had on the right side, a cyst of the thyroid, about the size of a fœtal head, which had existed for a great many years. I was hastily summoned one day and found him completely cyanosed, with a small pulse, and rattling respiration. The cyst had always occasioned him some difficulty in breathing, but the immediate condition had been brought on by acute catarrh, resulting from a recent cold. His medical attendant had employed divers remedies for the catarrh, but the difficulty of breathing kept on increasing, and threatened to terminate fatally by œdema of the lungs. I felt bound to do something to ward off the imminent danger, although I did not expect much chance of saving his life, either by puncture, injection with iodine, or incision. I hesitated to lay open the cyst, on account of its size, and partly also, from fear that the operation might lead to extension of sloughing, and suppuration of the inner surface. Moreover I thought that the inflammation always following any operative treatment of bronchoceles, would probably prove fatal. As I had formerly seen more violent reaction follow after simple puncture than after puncture combined with iodine injection, I selected the latter method. The evacuation of the contents of the cyst only partly succeeded, for though I employed a trocar of moderate calibre, the fluid, which was of a brownish-red colour, only escaped in small quantities. The canula constantly became choked, and then had to be cleared again; the cyst required to be pressed repeatedly and a part of the fluid could only be drawn off with a syringe. Manipulations of this nature, where there is no dyspnœa leads often to such bad results, that in this case I feared so much the more that violent inflammation of the sac would ensue. At last I succeeded in emptying the cyst, and then injected half an ounce of strong tincture of iodine, and applied a collodion bandage. Although the patient was much relieved from his dyspnœa by the operation yet he did not rally properly, owing to his very weak state. In spite of strong morphia injections, he had passed many sleepless nights in succession before I saw him. From the comparatively slight effect on the dyspnœa, it seemed possible that his condition was due to swelling of the tracheal mucous membrane at the constricted part, as well as from emphysema and bronchial catarrh; however, his condition for twenty-four hours after the operation improved. The cyst then

again increased in size and during the next evening a quantity of fluid escaped from the scarcely closed opening and air got in. The next morning I was obliged, on account of the great tension of the cyst, to lay it open, and the afternoon of the same day he rapidly sank and died. No post mortem was permitted.

Cystic bronchocele.

M. W—, æt. 18, had a tumour, the size of a large apple, in the middle line of the neck, which had existed for eight years. This was punctured and some chocolate-coloured fluid evacuated. Five weeks later the growth had made so little progress towards resorption, that I punctured again. On this occasion only some thick granular pulp was let out. The cyst walls then swelled up considerably and the patient became feverish, so that I determined to make a small incision. The cavity of the cyst was found completely contracted, and the swelling was only caused by the thickening of the wall.

Carcinoma of the thyroid.

P. S—, æt. 28, a slightly built, ill-nourished, anæmic woman had observed, two years previously, swelling of the left half of the thyroid, which had increased very slowly and without pain. When I saw her the tumour was the size of a hen's egg, very hard, and immovably connected to the trachea; it caused intense dyspnœa, quite disproportionate to the size of the tumour. I supposed that the growth was an ordinary "struma" partly calcified, and suspected that a process extended down beneath the sternum, and there pressed on the trachea. I extirpated the tumour, and found the operation one of the most difficult which I have ever performed. There was great difficulty in separating the tumour from the trachea and the deeper parts; the hæmorrhage was very severe, and attacks of suffocation occurred and she seemed several times during the operation on the point of death from asphyxia. The left inferior thyroid artery had to be ligatured. The patient recovered from this very formidable operation and her breathing became again gradually free. Almost immediately after the operation, however, the following remarkable condition was manifested; the patient almost always choked on swallowing the least fluid, and she could only avoid this by swallowing, with the greatest caution, minute quantities at a time. This troublesome condition existed for several weeks; the voice, which before the operation was rather hoarse, became after the operation still more hoarse and bass. Remembering previous similar cases, I concluded from these symptoms that the left recurrent nerve had been included in the ligature placed around the thyroid artery and in truth, Dr. Schrötter, on examination, discovered complete paralysis of the left vocal cord. The tumour proved to be very different from an ordinary bronchocele. Numerous amorphous calcareous deposits were indeed seen, but microscopically cylindrical and spherical cells were found in the soft mass of the tumour such as exist only in typical alveolar cancer. Four months later the patient came back; on the whole she had somewhat improved and the tendency to choke only

occurred, if she drank fast: the breathing, however, had again become impeded, and the breath was very foul. With the aid of the laryngoscope the tube of the trachea was found to be much narrowed by a nodulated growth which had invaded the left wall of the larynx and trachea. The patient was anxious for a second operation, but under the circumstances, I could not advise it. She died two or three months later from suffocation.

Carcinoma of the thyroid (struma-carcinomatosa).

A. G—, æt. 35, an emaciated, weakly woman, had from her childhood, a thick neck. For two years the tumour had increased more rapidly, so that on admission, the entire right side of the neck, down as far as the clavicle was occupied by an immovable growth. Operation was out of the question. The jugular vein was found post mortem to be crammed full of the cancerous mass. Metastatic tumours were also discovered in the lungs and liver. The disease had lasted about two years.

Malignant bronchocele.

A remarkable case of this nature was met with in a man, æt. 61. The bronchocele extended deeply beneath the sternum, and compressed the right innominate vein. As a result, all the subcutaneous veins of the neck, and the front of the trunk, became converted into an enormously dilated convoluted mass. The patient died shortly after his admission of marasmus.

The case is recorded at great length in the 'Wiener Med. Wochenschrift,' 1877, No. 1, by Dr. Kretschy. The drawings on Plates II and III will sufficiently illustrate the case here. The tumour was found after death to be a medullary cancer of the thyroid, partly cystic; during life it occupied the position shown by the dotted line in Pl. iii, fig. 6 *c*.

Two cases of abscess of the thyroid gland.

The first was that of a man, æt. 30, who had from his childhood a thick neck. Without any known cause, the left half of the thyroid gland became painful and swollen. Ten days later the skin was much reddened, and fluctuation was distinct. Onchotomy was performed. The patient was in a high state of fever at the time, but in three weeks he was able to leave. For a fortnight after the incision, he had relapses of fever, with continual discharge of pus at the lower part.

The second case was that of a woman, æt. 26, who, after a natural confinement, had severe feverish symptoms and much pain in the head and neck. An extremely tender swelling then formed on the left side of the neck, and soon ran on to acute inflammation of the left side of the thyroid, which

was moderately enlarged. Rapid recovery followed the opening of the abscess.

Bronchocele during pregnancy.

A woman, æt. 33, was admitted to the lying-in ward with a large, diffuse, bilateral bronchocele. As her dyspnœa was excessive, premature labour was induced at the seventh month of pregnancy. After delivery, the dyspnœa constantly increased and the patient was transferred to the surgical ward almost in a state of asphyxia. She recovered in some measure after tracheotomy. Pneumonia of the right side followed and carried her off. Post mortem, only hyperplastic enlargement of both lateral lobes of the thyroid was found.

An almost exactly analogous case also terminated fatally after tracheotomy.

Tumours of the Thyroid.

Parenchymatous injections of tincture of iodine.[1]

The following observations are founded on the cases which came under my care between 1860 and 1876.

I have never employed parenchymatous injections of iodine in undoubted cases of cystic bronchocele, although my colleague, Störk, has seen cystic bronchoceles shrink up after repeated injections of small quantities of this drug. In old, partially calcified bronchoceles, which are usually permeated by very large blood-vessels, I have likewise abstained from the use of iodine. In doubted carcinoma the remedy is always useless. I always use the pure iodine tincture of our Pharmacopœia for injection. As regards the risk, I think it less dangerous to inject the pure alcoholic solution of iodine, than mixtures of water and tincture of iodine. If the alcohol be much diluted, swelling of the tissue, and subsequent decomposition, may be brought about; the pure alcoholic solution of iodine, produces immediate coagulation and contraction of the tissues with which it comes into contact. On the first occasion I inject about half an ordinary subcutaneous morphia syringe-full. The syringe should be filled with the tincture of iodine before the point is screwed on, the piston pressed down so as to exclude all air, and the point must then be plunged deeply into the bronchocele,

[1] See also above, p. 159.

which is steadied by the left hand, and the contents of the syringe rapidly injected. There is no need to put any plaster over the little puncture. I describe this proceeding minutely, since I should like to see this method more extensively adopted by practical surgeons, and perceive that many avoid it from fear of some ill consequences resulting from not carrying out the details accurately.

There may be some trouble and delicacy required in puncturing bronchoceles smaller than a hen's egg; of course, nothing should be injected unless the operator is certain that the point has entered the bronchocele, for to inject tincture of iodine into the cellular tissue would probably cause suppuration. It does not matter in what direction the puncture is made. It is better to vary the situation of the punctures and the directions in which the fluid is injected. If the diameter of a bronchocele can be approximately estimated, there is no danger of penetrating it and injuring the trachea, œsophogus, or the large vessels of the neck. This method of treatment can only present any difficulties when the bronchoceles are small and very movable.

The immediate effect of the injection varies greatly in different patients; most of those so treated experience just a slight burning sensation after the injection: others describe an unpleasant feeling of tension, while many complain of severe pain extending over the whole face and jaws, which lasts for several minutes and is at times associated with a sensation of great distress and faintness. The presence of iodine can be proved after a short time—say half an hour—in the urine and saliva. Slight swelling and pain, lasting from three to eight days, is nearly always experienced about the injected part. If, as usually happens during the subsequent week, distinct, though only slight diminution in size takes place, the treatment may be pursued with confidence. The patients are able to estimate with tolerable accuracy the diminution in the size of the growth by the fit of their clothes or cravats. If a rapid cure be required, we should not wait until all trace of tenderness resulting from the previous injection has passed away; a syringe-full should be injected twice or three times a week, at different parts of the bronchocele; more than this, according to my experience, is not to be recommended. Many patients are anxious to get well with the utmost possible speed; they may experience little or no pain from frequent injections, or, if they do, they keep it to themselves. If

the bronchocele be injected every other day, or daily, no ill effect in the general condition will probably be noticed for the first week, but then, after repeated injections, rapid emaciation sets in even in strong individuals; the patients become languid, exhausted and feverish at night; the eyes are bright and sunken, the urine contains albumin, and sometimes the sputa show traces of blood, while the patients are troubled with cough and catarrhal inflammation. Formerly I did not quite believe in these subacute and chronic states of iodism, for I never saw it after the use of iodide of potassium in large doses; I no longer now, however, have any doubt that the condition above described is the direct result of the iodine. Many pathologists take quite a different view, and hold that when a bronchocele, from any reason whatever, disappears rapidly, the organism becomes affected owing to the taking up of the products of the broken-down tissue, which had been absorbed from the bronchocele. The emaciation is then, according to their view, not caused by the iodine, but by the absorption of the broken-down tissue of the bronchocele. It is exceedingly difficult to say which view is the correct one. I can only recall one case where the patient was not taking iodine in which the rapid disappearance of a bronchocele was attended by emaciation.

A man, æt. 50, had suffered for many years from bronchocele of the left side, of the dimensions of a large fist; tabes gradually developed, which seemed to have its starting-point in the brain, and was associated with ptosis of the right eye. In the course of a year he became reduced to a skeleton; he had suffered from severe neuralgic pains, allayed by frequent morphia injections. Simultaneously with this general emaciation the bronchocele entirely disappeared.

Now, could it be said in this case that tabes was secondary to the disappearance of the struma? Hardly, I think; rather the relations of the two processes must have been reversed. I only adduce the case as an example of the disappearance of a long-existing bronchocele accompanied by rapid emaciation, without iodine injections.

Although this only occasionally happens, yet I have observed emaciation accompany the injection of iodine in a good number of cases. I think that I am justified in entering a warning against any too rapid and bold attempts at cures of this description, especially in weakly individuals. Especially careful ought we to be with

young girls coming of tubercular families; in children under the age of six years, I should hardly care to employ the method at all, and at a later age after each injection great care and close watching are necessary.

I have seen bronchoceles the size of a fist so decrease in the course of four weeks after the iodine injection, that they were scarcely the size of a hen's egg. True, at the same time there was considerable emaciation. Whether these bronchoceles soon recurred again, or remained permanently contracted, I cannot say.

In a few cases I saw remarkably good results in bronchoceles situated in the middle line, partly substernal, and causing dyspnœa.

A child, æt. 10, who had a bronchocele of this sort, causing great dyspnœa, was sent to the hospital to have tracheotomy performed; he was kept under constant observation, and we were ready to do tracheotomy at any moment. I thought that I would try the effect of iodine injections, although I had some fear that they might at first increase the dyspnœa; however, this was not the case, for after forty-eight hours the child breathed much more freely. The injections were repeated at short intervals, and in fourteen days the respirations were perfectly free. Certainly, he became rather emaciated, but soon recovered from this with the assistance of good food and fresh air.

Undoubtedly the effect of the iodine treatment here was very striking, and this success is by no means diminished in my eyes by the fact that six months later the dyspnœa gradually came back again; repetition of the former treatment again brought about equally good results. The parents were sensible enough to bring the child up twice weekly for a long time, in order that we might inject the bronchocele. The treatment was pursued till the bronchocele became so small that we could hardly inject it with any safety.

Dr. Gersuny, my assistant, met with equally good success in the case of a woman with a large bronchocele, which surrounded the entire trachea, and produced severe dyspnœa, and occasionally almost suffocated the patient.

No one who has examined the anatomical structure of many bronchoceles can be astonished that the injections of iodine act upon bronchoceles with such varying effects. It is only in the diffused, hypertrophic glands, in which the development of the vessels keeps pace with the new formation of gland tissue, that the structure of the bronchocele is unaltered. Sooner or later, changes,

the result of irregular circulation, occur in most encapsuled goitrous growths. Extravasations of blood are frequent, portions may break down into a softened, colloid tissue, or become necrosed (yellow infarcts), while central cicatricial contraction is very common. Sometimes the growth calcifies; at other times all the blood-vessels passing into the bronchocele through the capsule become obliterated, and so the entire contents of the capsule degenerate into a pulpy, sebaceous-like matter; the original tissue of the bronchocele and the colloid substance of the gland vesicles cannot be absorbed by themselves. When united with iodine, however, they are absorbable. With our present knowledge of chemistry it ought not to be impossible to analyse these processes. After the absorption of the colloid substance, the tissue shrinks up into a cicatricial-like mass; the tissue of the bronchocele does not entirely disappear, like that of a lymphoma after the use of Fowler's solution, but a hard cicatrix remains where the substance of the bronchocele formerly existed. Even after the most successful cures of goitre by injection, these cicatrices do not entirely disappear. If a bronchocele consists of cicatricial tissue ill supplied with blood, non-vascular infarcts and pulpy substance, the iodine will have a very slight and very slow effect in causing its absorption and may have none. The most brilliant results were invariably observed in bronchoceles that had either recently originated or were rapidly growing. It would be very desirable for those who have opportunities, to watch these individuals for a long period of time after the employment of this plan of treatment; we might then learn whether recovery is permanent, or how often the injections must be repeated in order to destroy the tendency to goitre. I cannot too highly recommend the works of Lücke, Kocher, Rose and others, for those who wish to study the subject of bronchoceles. Notwithstanding all the labour that has been expended on the etiology of this disease, much remains unexplained; next to the undoubted endemic influences, a purely individual disposition plays some undetermined part in its causation. Thus, I know of a family, living in a district where goitre is common, and in whom two children out of four had no trace of goitre; one of these was a boy, the other a girl, both of whom died when about ten years old. In both the other children, who were girls, goitre developed at the age of four. In the younger of the two, the bronchocele disappeared completely, after the employment of iodine, internally and

externally, when she was six years old, and at the age of twelve, had not grown again; in the other older child, the goitre, of tolerable size, was still existing at the age of sixteen, and had to be from time to time treated by the injection of iodine; usually one injection every six months was sufficient. All four children were throughout placed under the same condition of life.

I have been repeatedly assured by mothers here, in Vienna, that their girls who, when children, had very thick necks, lost this condition on reaching puberty, whilst in other girls bronchoceles first developed at this very time.

The following case, which I observed in private practice, is of an interesting nature:

A strong young fellow, about sixteen years of age, came to me with a diffused bilateral bronchocele, of considerable size, which had commenced fourteen days previously. The skin overlying the bronchocele was so much stretched, as to seem almost transparent. In all parts there was distinct pulsation in the bronchocele. The heart sounds were natural, and as there was no exophthalmus, my impression first was, that the case was one of commencing morbus Basedowii. One of my colleagues, whom I consulted, was of the same opinion. Notwithstanding that some of my colleagues were opposed to the treatment, I ordered inunction with iodine applications and the internal administration of iodide of potassium in ordinary doses, without however, expecting much from the treatment. I did not employ injections of iodine, for in strongly pulsating tumours these appear to me to be dangerous. Recovery was remarkably rapid; in six weeks the bronchocele had entirely disappeared. I was interested to find that Lücke has observed several similar cases.

I have elsewhere mentioned the unfortunate results of injecting alcohol into a bronchocele.[1] Possibly decomposition would occur less readily if rectified or absolute alcohol were injected, but still the entire injection might, by ill luck, be thrown into a vein, and fatal intoxication be the result. It certainly would be desirable in parenchymatous injections for bronchocele to replace the iodine by some other less dangerous substance. The few attempts that I have made with Fowler's tincture, a remedy certainly quite free from danger, were unsuccessful.

Between 1860 and 1876, of 92 cases of bronchocele operated on by myself only 18 died, and of 36 cases in which I extirpated a goitre 13 only were fatal. In opposition to the pessimist views handed

[1] In my work on 'Cocco-bacteria Septica,' p. 86.

down to me by my teachers, I look upon these results as not unfavourable.

Spontaneous softening of a large bronchocele in an old man.

E. H—, æt. 65, had suffered for thirty-five years from a struma of the right side, which had slowly increased to the size of two fists. In the course of two months, it had become soft and increased in size, and was rather painful at the upper part, but without producing any difficulty of breathing. A puncture showed that the greater part of the bronchocele consisted of a cyst, filled with chocolate-coloured fluid mixed with small solid masses; the base was firm. An incision an inch long was made under the spray, a drainage tube left in, and the wound dressed daily with careful antiseptic precautions. Absolutely no inflammatory reaction followed. Three weeks later there was no discharge through the drainage tube. The tumour had collapsed to the size of a small fist, and the opening healed up very shortly afterwards. Six months later the patient was perfectly well.

A man, æt. 66, who had had from his youth a bronchocele on both sides, noticed, four weeks before admission, a striking increase in size of the left half of the tumour. The growth was so soft that the existence of fluid was suspected; however, a puncture with a small fine scalpel let out only some blood. The swelling now increased though kept down as much as possible by the continuous application of ice. A few days later some pus escaped from the puncture, and he was attacked with erysipelas, which commenced at the wound. Later on, purulent discharge again occurred, and the tumour diminished to a considerable extent; the opening healed up completely.

Softening of sarcomatous thyroid tumour.

A man, æt. 21, had had for some time a "thick neck," but no enlargements of the lymphatic glands. The year previously he was attacked with some inflammation about the neck, lasting but a short time. A growth was then noticed on the right side of the neck, which had since grown rapidly and given a good deal of pain. When admitted, the patient was in a very low state, with extensive bronchial catarrh, anasarca, and dyspnœa. On the upper part of the right side of the neck was a large soft tumour. An incision was made into the mass, and some softening portions of the growth escaped; these had the structure of a spindle-celled sarcoma. Slight relief followed. He died a few day later from œdema of the lungs. I supposed that the case was one of softening lympho-sarcoma, but the post mortem showed that the tumour had probably originated in the left half of the gland; at any rate, no part of this was to be discovered.

CHAPTER IX.

DISEASES OF THE VERTEBRAL COLUMN.

Case of dislocation of third cervical vertebra. Case of sub-luxation of cervical vertebræ. Angular curvature—Case. Case of necrosis of lumbar vertebræ. Remarks on treatment of vertebral caries. Treatment of abscess. Cases of mistaken diagnosis in retro-pharyngeal abscess. Remarks on tumours of vertebral column. Lateral curvature—treatment of. Cases of spina bifida.

Dislocation of the third cervical vertebra forwards without fracture.

This injury was the result of a fall from the second storey of a house. The patient had also a depressed fracture of the skull, and a fractured sternum. When admitted into the hospital, he was not completely comatose, but in such a condition that it was not possible to estimate the degree of anæsthesia; he lay motionless, but could at will move the fingers on both sides. Death resulted on the second day, from œdema of the lungs.

Among my cases of caries of the vertebral column is a remarkable instance of a girl, æt. 8, in whom an abscess developed at the back of the neck, in consequence of which the head was always craned obliquely forward. An extraordinary amount of mobility was evident between the third and fourth cervical vertebræ. If the head were not fixed it fell forwards, as a sub-luxation had made its appearance between the vertebræ named; the condition was not painful, and by raising the head reduction was easily effected. I have never yet met with, or read of, any other similar case; yet I can only explain the condition on the supposition that it was the result of disease of the vertebral column, possibly a case of rapid destruction of the intervertebral discs, with relaxation of the vertebral ligaments. As long as the head was fixed by a fillet, like the instrument for torticollis, her condition was tolerable. No alteration

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was observed during the whole time that the child was under observation.

Kyphosis. Miliary tubercle of lungs and kidneys.

H. H—, æt. 11, had been suffering for many years, but for one year only previous to admission, was confined to bed. The pains first occurred in the neighbourhood of the left hip, and then along the spines of the vertebræ. The child was extremely emaciated, and in a miserable condition, with marked angular curvature of the lower dorsal vertebræ; the left lower extremity was much flexed at the hip and knee-joints; the right in the same condition, but to a less extent. About the left thigh were cicatrices, and beneath Poupart's ligament was a sinus which, together with another behind the trochanter, discharged thin, stinking pus. Baths were ordered and a liberal diet prescribed. Diarrhœa set in, and the child became marasmic. One day—three months after admission—he was attacked with severe headache and vomiting, which for a long time could not be controlled. Death followed three days after. During the last two hours of his life only, he was unconscious. Post mortem: some purulent exudation was found at the base of the brain, but no miliary tubercle; in the centre of the right middle lobe of the brain was a caseous nodule, surrounded by softened brain tissue, with many punctiform extravasations. Some miliary tubercles in the apices of both lungs and miliary nodules in the lining membrane of the pelvis of the kidney.

Necrosis of spinous process of lumbar vertebræ. Caries.

A. W—, æt, 16, a strong girl, fell off a stool, and caused herself great pain in the lumbar region. The pain persisted, but diminished in intensity. Gradually an abscess formed over the lowest lumbar vertebra. Six weeks after the fall it broke; since that time the opening never closed; it lay two fingers' breadth on the right side of the middle line, and two inches above the sacrum. The probe detected the presence of a loose piece of bone, which about corresponded to the spinous process of the fifth lumbar vertebra. This was removed some months after. After the removal of the sequestrum, softened rotten bone could still be felt. Subsequently another chronic abscess formed over the os sacrum, below the sinus. We heard subsequently that she died a year and ten months after the commencement of the disease.

Kyphosis.

T. D—, æt. 9, had ten months previously first noticed pain in the lumbar region. Eight months previously some of the lumbar vertebræ became prominent, causing a moderate amount of kyphosis; pressure on the affected part of the vertebral column caused no pain. The patient was kept on his

back, extension was kept up by means of a weight, and the pelvis was encased in a plaster jacket; the weight was increased up to 8 lbs. without giving any pain, but no noticeable improvement of the curvature resulted.

Treatment of Vertebral Caries.

The treatment of this terrible affection consists principally in keeping the patient in the recumbent position. If there was much kyphosis the back was supported by jackets made of plaster, gutta percha, or pasteboard, and the ordinary "anti-scrofulous" strengthening remedies were given. Sometimes, in well-nourished individuals, an issue was made in the neighbourhood of the vertebral column. In acute inflammation of the cervical vertebræ the good effects of a seton are sometimes remarkable. Treatment with ice would here also undoubtedly be of benefit if it were possible to apply the remedy more conveniently. If an ice-bladder be laid at the back of the neck the air collects at the upper part and the direct effect of the cold is lost; the patients have therefore to be kept in a half sitting-up position.

In Zürich, at an earlier period of my clinical career, I was in the habit sometimes of opening abscesses connected with diseased vertebræ, sometimes with the trocar, or by subcutaneous incision, with caustic, etc.; no benefit was ever derived from this proceeding. I was induced at one time, though not very often, to inject iodine into these abscesses; I invariably regretted it. The chronic suppuration becomes acute much too readily, and leads then to breaking down of the abscess walls and most severe general symptoms. The beneficial effects of injections of tepid water, air, or water with a very slight trace of tincture of iodine, seem to me doubtful. If the opening of the abscess is too small the best plan is to dilate it with laminaria. I lost one patient from pyæmia after extending the opening by incision. Now I no longer open these abscesses, for I have come to the conclusion that matters are never improved by such treatment, and the best that can be hoped for, in the most favourable cases, is that they are not made any worse. After these abscesses have opened spontaneously they usually contract, and a sinus is left; they are then much more likely to heal. It is extremely difficult to convince oneself of the truth of these principles, much more to persuade the laity to accept them, for the

latter judge by what they see in cases of acute abscess, and have an idea that letting out the matter cures the disease. Recovery depends materially on the constitution and the position in life of the patient, influences on which medical art can have but little effect. To attack the disease directly usually does more harm than good. Probably more of these cases would recover if the patients were placed under proper dietetic treatment, and could be induced to rest at an earlier period. From the nature of the disease, the children of the poor are not brought to the surgeon until curvature is manifest and one or more of the bodies of the vertebræ is already destroyed. Most adult patients, too, go on for many months without heeding the warning of the surgeon, and it only first occurs to them that they are ill when they have pain and difficulty in doing their work; then usually it is too late. It is often said that this is only true of the uneducated classes, but this is by no means the case; it is so with all people who have to gain their livelihood by work.

From tables it appears that patients affected with spinal caries not unfrequently die in the first year of the disease, but much more commonly in the second. The third year of the disease is also dangerous; if the patients survive this period, their chance of life is much better, but still the disease may have a fatal issue even after thirteen years' duration. In a case which was under my treatment at Zürich, some dormant infiltration of the vertebral column developed very rapidly and acutely, after resection of the head of the humerus for caries, in a girl fourteen years of age. For eighteen days after the resection, all went on well; then very acute ostitis,[1] and periostitis of the cervical vertebræ began simultaneously with suppuration of the right metacarpus and the left metatarsus. Unfortunately, no post mortem was allowed. In Vienna, I saw caries of the cervical vertebræ develop with great rapidity, in a woman, æt. 74, who died of marasmus, three months after the first symptoms of the disease appeared. Hitherto, I have never seen any cases such as have been described by other authors as general tuberculosis of the vertebral column, combined with general neuralgia, though unfortunately I have only too often had opportunities of observing the latter symptoms in cancerous affections of the vertebral column. Besides the symptoms of phthisis and marasmus, which these patients manifest, amyloid degenerations of the internal organs and caseous deposits can often enough be

[1] *I.e.* Osteomyelitis. See 'Billr. Path.,' p. 296, and Appendix II, infra.

diagnosed during life. In children, acute basal meningitis not unfrequently finally caries off the patients. If the disease commences in adult life, general tuberculosis, in many cases, soon becomes evident, even if it were not already in existence when the vertebral column became affected. I have not observed hitherto that the paralysis (usually connected with contraction of the muscles) which sometimes follows Pott's disease, can of itself prove fatal. I have often been astonished to observe how long patients paralysed in this way are able to exist when placed under favourable conditions. The paralysis, even when it has reached a high degree, may disappear in part, sometimes almost entirely.

I see now, from time to time, a girl, æt. 18, in whom paralysis of the lower extremities has existed for four years, as the result of caries of the spine and angular curvature of many years' standing. A year after the commencement of the paralysis, there was entire absence of movement in the extremities. Since then some slight movements have gradually returned. When I last saw her the legs were somewhat flexed at the knees, and attempts to straighten them gave severe pain and general cramp. The patient has to be kept constantly lying. Attempts to straighten the legs gradually, so as to enable her to get about, by means of some artificial support, proved fruitless; the application of the constant current did not diminish the great reflex irritability. I cannot say for certain whether faradisation of the muscles had any influence in bringing about the slight movements which she now possesses in the lower extremities. The sensibility of the skin seems quite unimpaired.

From Menzel's highly interesting statistics on the subject of caries ('Arch. f. Klin. Chir.,' Bd. xii, p. 340) we may gather that the vertebræ are more frequently affected with caries than any other bones. Of 1196 cases of caries, the vertebral column was affected in 702; the different sections of the spine were affected in the following proportions:—Cervical vertebræ 185; dorsal vertebræ 310; lumbar vertebræ 199; in 8 cases the part affected was not stated. I was very much interested in observing that the small number of cases (90) in my clinic proved also that the dorsal vertebræ were more frequently affected, from which we may fairly deduce that a collection of 100 cases is sufficient to show the true proportion. Unfortunately in my records, the actual vertebræ involved in the kyphosis are not precisely noted, so I cannot say whether my small number of cases confirms the observations of Menzel, that the second cervical, the sixth dorsal, and the fourth lumbar vertebræ are most frequently, and the fifth cervical and the first lumbar are most rarely diseased. V. Menzel's chart (loc. cit.

p. 356), deduced from the record of 694 cases, shows in an interesting way the most common form of kyphosis.

As regards the chance of recovery from spinal caries, what can I say? I have adopted a position of complete resignation, the more that I have come to the conclusion that my records are too favourable; it was not often possible to keep little children, from one to three years old, under continual observation, and it is just at this period of life that the mortality among children is most considerable. I may add, that from my experience of caries, a congenital predisposition seems to be by far the most common source of the disease. In patients thus predisposed, some accidental cause of irritation sets up active disease, although the latter may often occur without any possibility of proving any such cause of origin. Children with spinal caries require to be most carefully kept from all other sources of injury, and placed under generally favourable hygienic and dietetic conditions; such conditions demand the constant attention of some grown person and favourable social circumstances. Even when the opportunity offers of treating these children for a long period of time, and when all these conditions were fulfilled in the best possible way by the constant and watchful care of a mother, how seldom are the efforts of the surgeon crowned with success. As an example of many similar cases, I adduce the following:

A girl, æt. 8, who had previously been in good health and well nourished had a small, cold abscess over the left sixth rib. My advice was, to wait for the spontaneous opening of the abscess, which took place about six months afterwards; in two months the abscess had healed without any medical treatment, and the general condition of the child was unaffected. A year later all the symptoms of disease of the cervical vertebræ made their appearance. The child was most carefully tended; for about a year she was kept completely at rest, then an apparatus to fix the head was provided, which was worn for about three years. During this time the patient lived during the summer at Hall and Ischl, during the winter at Mentone and Meran. A retro-pharyngeal abscess formed and was allowed to open spontaneously, as also another abscess at the back of the neck. A small sequestrum came away from the opening in the neck, and the sinus eventually healed completely. All the pain disappeared; the cervical curvature was scarcely noticeable, but there was no movement in the upper cervical vertebræ. The child seemed in excellent health; she became fat and strong, spent all the summer in the mountains, and was always tended with the greatest care. Any surgeon would have set down the case as one that had completely recovered, but this lasted scarcely three years; then the mother noticed that the child held

herself more stiffly than before, was less inclined to move about, and could not speak well. I examined her most carefully, but could find nothing wrong; a few months later, a prominence was noticed on the left side, close to the spine, which proved to be a chronic abscess, and soon after curvature began to develop in the lower dorsal vertebræ; the patient was taken off to a southern climate, but a few months later numerous abscesses broke, and the excessive suppuration so exhausted her that she died, about fifteen months after the commencement of the second attack of the disease. The parents and relations were healthy, with the exception of the mother, who was delicate and of weakly frame, and who had a slight attack of hæmoptysis, about a year before the death of the child. Such cases show how powerless we are against constitutional predisposition.

I need hardly say that I always assign the first place to such hygienic and dietetic conditions as may seem most important for the case under treatment, but how seldom is it found possible to carry out these regulations.

As for local remedies, I used to employ setons, issues, and tinct. of iodine, as was recommended by my teachers. The inefficacy of these remedies led me later to give them up completely; constant application of ice, for three or four months (especially in cases of commencing disease in girls), is of some benefit, though unfortunately, the effect of the remedy on the pain and inability to move was only of a transitory character in my patients.

Formerly, I used to keep these children always lying, generally in the prone position, as I had been taught to do; in some cases, I employed extension by weights, and more recently have sometimes used Thomas's splints. It is often difficult or well nigh impracticable for poor people, and even for those of the middle class (the bourgeoisie), to keep their children constantly at rest; if the children be of a lively disposition, they require the constant attention of some one at their bedside, or else they are more frequently sitting up than lying down in bed. I have never seen any remarkable advantage arise from this constant lying or a more rapidly favourable issue; at times the curvature seems to be somewhat improved, but this becomes as bad as before as soon as the child stands up. Latterly, if patients have no pain with curvature of the dorsal or lumbar vertebræ, I have always allowed them to get about as much as they pleased, wearing a stiff jacket. These jackets should be made of the lightest possible material and surround the pelvis, so that the upper half of the vertebral column above the curvature is supported in a sort of funnel, which takes off all the weight from

the diseased parts. This can only be properly applied when the curvature is on a level with, or lower than the fifth dorsal vertebræ; if the curvature be higher, the upper part of the vertebral column must be supported by a suitable apparatus, either on the plan of the old apparatus for torticollis, or on the plan advocated by Taylor, in which the head is supported from below at the occiput.

By the use of appliances of these kinds (which I have especially employed of late years in private practice), I have seen just as good results as when the children were condemned to be constantly lying down. Usually the parents are much more easily persuaded to purchase such apparatus, and to apply them regularly, than to keep the children for periods of years lying on their backs or faces. I do not say that it is better for these children to wear supports of this nature than to be kept constantly lying down, but it is much more advisable for them than that they should sit up in bed, as they do, without any support for the greater part of the day.[1]

I need hardly say that in spite of my somewhat pessimist opinions as to the prognosis of spinal caries, I always recommend the parents of these children to tend them with the utmost care. Writing, as I do, for my colleagues, I consider it my duty to describe by observations unreservedly as I have done. I should be glad to learn that I have drawn too dark a picture, and would only ask my colleagues to withold any definite opinion until they have kept their patients under observation for ten years or more, and can then give their experience of the ultimate results in figures.

With regard to the treatment of congestive abscesses my advice is never to open them. I never saw abscesses of this nature descend beyond the middle of the thigh; usually they open spontaneously when they are still in the upper third of the thigh. I have not met with a case where the abscess burst into the abdominal cavity. I usually regretted it when I opened these abscesses. In one case lately, led away by the eulogistic terms in which the result of opening, draining, and antiseptic treatment of these abscesses had been described, I was induced to open a congestive abscess in a case where fluctuation was just perceptible beneath Poupart's ligament. The third day after the opening arterial bleeding took place

[1] A simple and effective contrivance to obviate this is in use at the Hospital for Hip Disease in Queen's Square, London, and elsewhere. It is described by Mr. Edmund Owen in his "Harveian Lectures," 1880, published in 'Louisville Med. News,' vol. ix., No. 222, p. 151. (Ed.)

from the abscess. This was controlled by pressure after it had recurred three times, but some days later it carried off the little patient. A small perforation was found in the iliac artery, which lay completely exposed on the floor of the abscess. If the skin is thin and reddened over any part of an abscess in the thigh puncture will do no harm. Possibly, also, the abscesses may in some cases be opened at an earlier period without any directly injurious effects. But I can perceive no advantage from early opening, save that the minds of the parents seem to be set at rest. Such cases as these can be but rarely taken into hospital, and even when admitted only kept in for a short time; few families have the means to provide for the daily or even weekly antiseptic dressings. Nearly always a kind of valvular closure of the sinus follows after spontaneous opening; the discharge flows away slowly, usually being little more than serum or very thin pus (curiously enough, this has been ascribed to the antiseptic dressings), and nothing gets in from without. In abscesses that have been allowed to open spontaneously I have never seen decomposition of the pus occur, even when, as often happened, they were dressed with the dirtiest rags. While in Zürich, I saw a case of pyæmia follow the probing and dilatation of a sinus. As a rule, nothing of therapeutical importance is learned by probing such abscesses, and the practice is therefore not one to be advocated.

Undoubtedly, cases of caries necrotica of the vertebral column occur where the closure of the sinus is prevented by a sequestrum. Hitherto, however, it has been found impracticable to extract large sequestra from the vertebral column; small sequestra mostly come away of themselves without endangering the life of the patient. It might seem possible to make an incision on one side of the curvature, and in this way to extract the sequestrum and gouge away the carious parts, but the hæmorrhage cannot be readily controlled, and the spinal cord will be exposed to injury; hitherto I have not ventured on the attempt. In children already in a low state, on whom such an operation might be performed as a last resource, there is no prospect of the parts healing up. I have never felt inclined to undertake such a proceeding in children who were tolerably well-nourished, though such an operation, in cases of commencing caries in other bones, yields capital results. Yet with our advanced knowledge of the treatment of wounds, and in the face of the unfavourable prognosis, I should not blame any surgeon for making

the attempt. I remember some years ago to have read something about an operation of this kind which was performed in America, but I do not recollect what became of the patient.

It need scarcely be stated that abscesses connected with caries of the cervical vertebræ must be opened if they cause any difficulty of respiration. One would hardly think that the diagnosis of these retro-pharyngeal abscesses could be a matter of doubt, and yet I have twice been mistaken in such cases.

In one of the patients, the apparent abscess was found to be a diffused, very soft, medullary lympho-sarcoma, with a rounded surface and distinct fluctuation; the cervical lymphatic glands first became affected some weeks later, and the patient died of the tumour a few months afterwards.

The second case was that of a healthy man, æt. 18, who, in addition to a bronchocele, had a fluctuating retro-pharyngeal tumour. All that the patient could tell us was that for some weeks he had found some difficulty in swallowing and breathing, and his voice had been nasal. The appearance of the man hardly led us to suspect disease of the spine. After consultation with Professor Störk, we came to the conclusion that the swelling was due to a retro-pharyngeal abscess. An incision was made into it, and we were not a little taken aback when a tremendous stream of dark blood gushed forth. The situation was a most distressing one. Direct pressure was scarcely practicable; the blood was partly swallowed, and then vomited up again, in part it descended into the larynx and was coughed up. Finally, while I made pressure on the carotids, Professor Störk quickly prepared a solution of alum, which the patient took into his mouth, and the bleeding was eventually controlled, but not before it had caused us the greatest anxiety. The patient became very faint; we kept him lying on his back for some time, and made him keep small pieces of ice in the mouth. The hæmorrhage did not return, and in a few days the opening of the incision closed. This was a case of a hæmatoma in the posterior wall of the pharynx, resembling a retro-pharyngeal abscess.

I cannot understand how it could have been in any way connected with the bronchocele, which was of small size, for these small thyroid tumours do not exert any pressure on the viens; even in large bronchoceles, into which blood-vessels almost the thickness of the finger pass, I never saw a hæmatoma of the pharynx. Professor Störk was kind enough to give me the following information about the patient some six months later:—"On the left side of the pharynx in the same situation is a uniform, soft, non-pulsating tumour, with broad base, of moderate circumference, and but slightly prominent. The cicatrix of incision is still visible; the hæmatoma is now, as before, invested by a tough wall; the bronchocele has

not altered. The patient can now breathe and swallow without difficulty; in other respects his general condition is unaltered; the guttural tone of voice exists as before." Remembering my former experience, I did not venture to make a fresh incision, or to employ galvano-puncture. The hæmorrhage was so formidable that even the most intrepid surgeon would not readily have forgotten it.

Tumours.

I have met with no cases of primary tumours in the vertebral column, and my only acquaintance with them is derived from museums and atlases. Metastatic cancer of the spine, following cancer of the breast, I have seen tolerably often. I hardly know any more terrible disease than this. The last cases which I had occasion to see very often, occurred in young, well-nourished women about thirty years of age. These patients suffered for five or six months most unspeakable agony before death came to their relief. In the face of such diseases one is compelled to look almost leniently on suicide. I remember once, after a consultation with one of my colleagues on one of these unfortunate cases, he remarked to me as we were going down stairs, "Should we not be almost justified in prescribing cyanide of potassium in such a case?" But a saying of Griesinger's rose before my mind, "The surgeon should not give up his patient until he has drawn his last breath."

Lateral Curvature.

My experience does not enable me to say much about the treatment of lateral curvature. I generally advise the remedies recommended by the best authors. These patients were never admitted into the hospital; the slighter cases would not remain in, and in the severe cases so little could be promised that we did not feel justified in burdening the parish with the expense of keeping them for some years in the hospital. The out-patient department sufficed for purposes of clinical demonstration. It is an unfortunate thing, from an educational point of view, that so few opportunities could be afforded of studying the treatment of these cases, or of seeing the ultimate results of this very common affection. This want is often

felt and embarrassment experienced when such cases are afterwards met with in private practice. I tried to obviate this clinical defect, as far as possible, by constantly talking about the causes and treatment of commencing lateral curvature.

As for the numerous cases which I have met with in private practice, they were commonly lost sight of after they had consulted me once or twice. If the complaint does not improve in the course of a few months, or if I am compelled to say that the necessary treatment may last perhaps a year or more, they go on from one surgeon to another, until they discover one who takes a more hopeful view of their case. Advice and prescriptions are far more agreeable to the patients and their parents than innumerable rules and regulations as to diet and gymnastics. Such treatment becomes costly and troublesome, and swallows up, perhaps, all the means of the family to comparatively little purpose. In Vienna, it is not possible to keep these children in orthopædic establishments under 1200 or 1500 florins a year (from £115 to £140), and if the necessary orthopædic treatment has to be kept up for two or three years, most families would hesitate before they laid out so large a sum for the benefit of one of their children, when perhaps the entire family live in some little town and have no more than an annual income of 800 florins.

In my private practice, I see annually a great many girls affected with lateral curvature, but I fear that all my powers of persuasion are unable to induce perhaps more than one annually to enter one of these gymnastic institutions. Seldom can a positive answer be returned in the affirmative, to the question, "After all this trouble, can you promise complete recovery within two years?" In the majority of cases we can only promise that, at any rate, matters will not be made worse; the laity are little able to understand how much worse the condition might become, for the disease can be but seldom attended with any danger to life. These questions and arguments one way and another are interminable. Should a case remain stationary and the curvature grow no worse, as frequently happens, then we hear said, "We see these surgeons exaggerate the whole matter—the fact is, they know but little about it, etc." We can only then, advise what we consider to be best on physiological —and empirical—grounds.

Spina bifida.

In the case of a child a few months old, the sac of the spina bifida had previously been tolerably tough and thick; the child had talipes equino-varus of the left and calcaneo-valgus of the right foot. Subsequently, large hydrocephalus formed; the skin over the spina bifida became very tense, translucent, and inflamed. Under antiseptics I laid open the sac, evacuated the fluid, and united the edges with sutures. Death followed five hours after the operation.

I remember another case, where I encircled with a drainage tube a slender pedunculated spina bifida over the sacrum, then punctured the cyst, and injected diluted tincture of iodine. The child died of myelitis a few days later.

CHAPTER X.

INJURIES AND DISEASES OF THE BACK AND BREAST.

Section A.—Injuries and Diseases of the Thorax, Back, etc.

Cases of penetrating wound of back. Gunshot wound. Case of fractured ribs with pneumothorax. Chronic periostitis and caries of the ribs—Cases and remarks. Case of encysted empyema. Resection of ribs for empyema. Case of partial pneumothorax after paracentesis. Aneurism of thyroid axis. Case of aortic aneurism bursting into œsophagus. Paralysis of serrati muscles. Case of ossification of the fasciæ of the back. Case of cyst of back treated by injection. Case of multiple soft fibromata. Case of racemose angioma; removal. Cavernous blood tumour and lipoma; removal. Cases of sarcoma of the back—recurrent spindle-celled; melanotic. Case of sarcoma of thorax of long standing.

Penetrating wounds of the back.

A. M—, æt. 20, received a stab in the back, on the left side, between the scapula and the vertebral column. Moderate amount of hæmorrhage, no dyspnœa or pneumothorax. The wound was closed by strapping; three days after the injury the wound was probed by a medical man, thereupon severe pleurisy occurred, which lasted three days. From the symptoms in this case, it seems possible that the wound had perforated an adhesion.

F. E—, æt. 29, was stabbed twice with a knife over the breast; one of the wounds, evidently a penetrating one, passed through the left third rib external to the heart. On the right side, an extensive stab wound passed into the third costal cartilage, but did not penetrate the pleural cavity. Both wounds were closed; severe dyspnœa followed, treated by venesection and morphia. The dyspnœa became worse, owing to increased left pneumothorax. On the eighth day after the injury, the patient felt as if he were

on the point of suffocation. Water was injected, after Griesinger's method,[1] so as to convert the pneumothorax into hydrothorax. The patient rallied a little and the dyspnœa somewhat diminished. Fifteen days after the injury, severe hæmorrhage took place from the wound on the right side; this was controlled, but collapse set in, and he died from increasing weakness and dyspnœa, thirty days after the injury. Post mortem: pyo-pneumothorax on the left side, and a wound of the right internal mammary artery.

U. M—, æt. 30, a strong man, was stabbed in the breast by a drunken comrade armed with a poignard. Blood flowed freely from a wound in the right first intercostal space, close to the sternum. A medical man was called in and the wound most carefully closed with three button sutures. The next day the patient was brought up to the hospital; there was then dulness on the right side from the middle of the scapula downwards; air and blood passed out by the side of the sutures. In order to determine whether the hæmorrhage came from the thoracic wall, the wound was reopened, and was found to extend deep down into the thorax. Dark blood welled from the cavity. The wound was again closed firmly with sutures. The patient had much difficulty in breathing, and complained of great pain in the right side of the thorax. There was some cough, but the sputa, which were brought up with some difficulty, were unmixed with blood. Two days after the injury the dyspnœa increased and was not relieved in any degree by venesection; collapse and death followed the next day. Post mortem: in the innominate vein, opposite the opening of the vena cava superior, was a wound about a ctm. in length, with somewhat irregular edges; firm adhesions of the right upper part of the lung, the pleura extensively covered with dry, fibrous lymph; in the right pleural cavity about 30 oz. of blood, partly fluid, but containing also much clot; the apices and the anterior halves of the lower lobes of the lungs alone contained air. Extensive sugillation of the cellular tissue around the heart.

Penetrating gunshot wound.

K. T., æt. 25, was shot in the back by a saloon gun at two paces distance. A medical man was called in, who drew a large paper wad from the bottom of the wound. There was but little hæmorrhage; some blood was coughed up. The patient was brought up the next day to the hospital; he then had some pain in breathing, and the respirations were shallow. Close under the left scapula was a gap in the skin, the size of the palm of the hand, with lacerated and blackened edges. On examination with the finger the wound was found to extend deep down as far as the ribs. No fracture could be detected, and there seemed to be no foreign bodies in the wound. On the left side there was dulness, in front and behind. For four or five days all went on well, but then he had increased fever and dyspnœa and rather abundant discharge of serum from the wound. During the

[1] 'V. Pitha and Billroth's Chir.,' Bd. iii, Abthl. ii, p. 161.

next fortnight he improved; then the dyspnœa again set in, and there were symptoms of left pneumothorax. Thin pus was discharged from the wound, and two or three days later air also escaped. He became collapsed, and died. Two days before death he had copious vomiting of bilious matter, with distension and abdominal pain. Post mortem: a small portion of the seventh rib, corresponding to the wound, was denuded of periosteum; the probe passed below the lower edge of the rib, and ran obliquely upwards for about eight inches into the cavity of the thorax; downwards, the opening extended for about four inches. The heart was found pushed towards the middle line. In the left pleura, three or four pints of thin, dark, foul pus. About the centre of the lower lobe of the left lung, was a ragged gap on the surface, the size of a shilling, The entire lung was compressed and contained no air. A square-shaped opening was found in the posterior wall of the œsophagus, just above the diaphragm, and the tissue between the œsophagus and aorta in the lower part of the thoracic cavity was converted into a dirty, stinking pulpy mass.[1]

Penetrating gunshot wound of the chest.

W—, æt. 23, attempted to shoot himself with a revolver. A very small aperture entrance lay under the left nipple, just external to the area of præcordial dulness. He had considerable hæmothorax and infiltration of the lobe of lower lung. Subsequently pleurisy with exudation followed, and at a later stage circumscribed pneumothorax (Höhlen-phänomene), with a good deal of purulent vomit, accompanied by febrile symptoms and emaciation. Eventually the patient recovered. The symptoms of the pneumothorax, and the purulent vomit disappeared entirely, but some dulness at the lower part of the left lung persisted. I suppose that the bullet was fixed in the left lower lobe of the lung, an abscess formed around it, which healed up, and so the bullet was encapsuled. We were unable to gain any further information about the case.

Fracture of the ribs.

In one case that came under notice, the fourth, fifth, and sixth ribs, were fractured anteriorly on the right side. The skin was raised up prominently over a broken off fragment of the fifth rib. The patient had a slight attack of pleurisy, which he got over. Gradually a small portion of the prominent skin became gangrenous. On the seventeenth day after the injury, without any further symptoms, the fragment perforated, but the projection was closely invested by the skin. Thinking that the internal opening into the pleura must have been firmly closed by exudation, I tried to extract the piece of bone.

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[1] I think that in this case there is no doubt that the softening of the œsophagus took place during life. With regard to this point see an interesting essay by Prof. Hoffman, of Basel. ('Virchow's Arch.,' 1868).

As I was moving the fragments air entered the thorax with a hissing noise; the protruding portion of bone was then cut off, and the wound closed by a suture. Pneumothorax was immediately evident; the dyspnœa increased, and was soon followed by pleuritic effusion. The patient became very feverish, and was threatened with symptoms of suffocation. Paracentesis was performed with a trocar, without allowing any air to enter, but no improvement followed; the sutures gave way, and from the opened up wound an erysipelas ambulans started. Repeated rigors followed, and he died of pyæmia thirty-nine days after the injury, and twenty-two after the operation; the latter undoubtedly was premature.

Chronic periostitis and caries of the ribs.

J. B—, æt. 29, was admitted with commencing tubercular disease of the lungs; for eleven weeks he had had chronic abscesses in the neighbourhood of the right nipple, in front of the third right rib, and in the neck. In addition to this there was a spontaneous fracture of the sixth right rib.

C. F—, æt. 53. In the course of three years a large chronic abscess had, without known cause of origin, developed on the right side of the back. He was admitted with a high degree of emphysema with bronchiectasis and pleuritic effusion on the left side; the breathing became gradually worse until he died of suffocation. Post mortem: bronchiectasis was found on both sides, empyema on the left side, communicating with the chronic abscess at the back part; a carious cavity in the sixth rib, and numerous osteophytes on the neighbouring ribs.

Chronic abscess and caries of the thorax.

J. G—, æt. 37, had suffered for many years from pains in the back; two years previously he had had a sharp attack of pleurisy. After he had recovered from this, a small tumour developed a little to the inner side of the left nipple. A few months later he had some severe pulmonary affection, followed by general dropsy; from this he gradually recovered, and regained a tolerable amount of strength. When admitted, there was a swelling, the size of a hen's egg, over the junction of the fourth rib with its cartilage. Distinct crepitus was perceptible between the cartilage and the bone. The swelling was tympanitic on percussion, and could be pressed back to some extent. Probably the case was one of circumscribed pneumothorax, *i. e.* an abscess cavity, which had burst into a bronchus. Posteriorly there was extensive dulness. I did not think it advisable to make an incision into the swelling and the patient was transferred to the physician.

Caries of the Ribs.

Spontaneous fracture of the ribs, as a sequel of carious destruction, was noticed in several instances (Case of J. B—, supra). In the ribs caseous ostitis and caries necrotica is not infrequent; small sequestra are often spontaneously extruded. In one case I resected portions of the diseased ribs comprising the whole thickness of the bone; three years later the sinuses were still discharging.

I can see no advantage in the early opening of abscesses dependent on carious ribs; I commonly allow them to break spontaneously. In tolerably healthy people incision does not accelerate the closure of the sinus, while in the tuberculous it is injurious.

Caries and Necrosis of the Sternum.

Although in only two of these cases could syphilis be positively established, yet here in Vienna I have seen an immense number of cases of chronic disease of the sternum, evidently of a syphilitic origin; some as out-patients, some in private practice. The disease appears commonly to occur when all syphilitic symptoms have ceased for many—perhaps ten or twenty years. It does not appear to me that disease of the sternum is often associated with tuberculosis, a connection which undoubtedly exists in caries of the ribs.

Chronic Abscesses without any perceptible Caries of the Ribs or Sternum.

These abscesses either remained unopened as long as the patients were under observation, or after they were incised no disease of the bone could be discovered, notwithstanding repeated examination. Twelve such cases came under observation, the ages ranging from fourteen to sixty-five. In two instances an attack of pleurisy had preceded the commencement of the affection, but at the time of admission no effusion could be detected in the pleural cavity.

The unfavourable prognosis that must be given in caries and caries necrotica of the ribs, is evidenced by eight cases which were under observation at Vienna; of these, recovery took place in one only and that at the end of five years. Even this man was of a wretched, weakly constitution, and obviously could not have long to live.

Encysted empyema (large peripleural abscess ?).

A man, æt. 22, had some glandular abscesses in the right axilla, after an attack of smallpox; and at the same time, pain in the upper part of the right breast, and severe rigors. The breathing was but little embarrassed. The abscesses had been opened five months before his admission. On admission there was but a moderate amount of suppuration, with dulness over the right upper half of the thorax. An extensive incision was made, and the broken down and suppurating gland tissue scraped out; four days later the opening in the intercostal space was found, and a drainage tube passed in. The suppuration then gradually diminished and the patient was discharged three months later at his own wish, with only slight discharge from the sinus.

Resection of ribs for empyema.

A child, æt. 12, had an attack of pleurisy seven years before admission, which ran on to empyema, and broke spontaneously. Three years later the child came under my care. I resected portions of two of the ribs with some benefit, but considerable discharge took place through the opening, and the patient's condition was only moderately satisfactory. Further resection of the ribs was performed four years later; seven years after the original opening the sinus still discharged, though only to a slight degree. Throughout, the patient was very carefully looked after. The child was rather small and weakly, but very intelligent, and had attended school for the last five years.

A child, æt. 8. Seven months after the commencement of pleurisy of the left side, spontaneous opening took place; a year later he was brought to the hospital. Portions of two of the ribs were resected, in order to allow the pus to escape more freely; injections were made into the cavity. Seven months after operation there was still considerable discharge from the sinus.

A woman, æt. 28. Six months after the commencement of pleurisy of the left side, spontaneous evacuation occurred. Ten months later she came up in a very reduced condition to the hospital. The fistula was dilated, and the cavity injected; she then went into the country for a time, and improved considerably, but eleven months later, there was still free discharge through the sinus. A portion of one of the ribs was then resected, and the contents of a cavity, the size of two fists, evacuated. The discharge had not ceased six months afterwards.

Partial pneumothorax, occurring after paracentesis.

A man, æt. 28. Eight weeks after the commencement of a pleurisy of the left side, paracentesis was performed with Dieulafoy's aspirator, and 300 c.c. of thick, greenish pus let out. When he came under my care, some little time

later, I let out 2700 c.c. of thick pus, by means of my paracentesis trocar, without allowing any air to enter. The next day it was noticed that each systole of the heart was accompanied by a distinct, metallic sound. There was no proof of the existence of any air in the pericardial region, but slight pneumothorax was evident, close to the heart; the respirations had a distinct metallic sound, and at times râles were heard. For four weeks he went on well, and was completely free from feverish symptoms. While recovering from an attack of facial erysipelas, the dyspnœa increased so much that I had to tap the thorax again.

Aneurism of the right thyroid axis, originating without known cause in an otherwise strong man.

A year and a half after the commencement of the disease, the patient received a kick from a horse on the aneurism; great swelling resulted, and when he came up two months later to the hospital, the tumour was the size of a fœtal head. The exact part implicated could not then be made out. I suspected at the time that the tumour was connected with the subclavian artery originally, and that the aneurism had become diffused, owing to the blow. Compression, by means of bags of shot, and the application of ice did no good; the swelling rapidly assumed such formidable proportions, and the patient became so anæmic, that I was unwilling to attempt to ligature the innominate artery. The aneurism did not actually burst, but increased to such a size that it appeared as if all the blood in his body must have been contained in the sac, and he gradually died of hæmorrhage into the aneurism. Post mortem: the subclavian artery was found intact, but an opening existed in the thyroid axis, just where it branches off from the main vessel.

The case was therefore one of false aneurism from the very commencement. I rather suspected that the patient deliberately gave a false account of his symptoms, in order to conceal the fact that he had received an injury from some one.

Aneurism of the descending aorta, bursting into the œsophagus.

H. E—, æt. 50. The patient, who was of a small and weakly frame, had fallen from a tree a month previously, and from that time felt occasionally pain in the left side. For nine months he had suffered from bronchitis, but with this exception had had no previous illness. A few days after the fall, severe burning pains were felt in the neighbourhood of the lower ribs, accompanied by constipation, loss of appetite, and irritating cough. On examination, the lungs were found to be healthy. Two days before admission, the patient fell into a deep fainting fit, from which he but slowly recovered. The physician who was called to attend him, discovered a soft, prominent, strongly pulsating tumour between the left scapula and the spinous processes,

extending from the fourth to the eighth dorsal vertebræ. The heart sounds were natural; no abnormal sound could be detected on auscultation over the tumour. There was no particular pain in pressing the growth, but the patient complained of pain radiating away from it, in a downward direction. Two days after admission, he complained to his next neighbour of a dimness of vision; immediately after he had an attack of dyspnœa and became completely unconscious. The assistant who was called to him found the pulse much quickened, the respirations rapid, the face blanched and sunken, the lips and gums white. He died a quarter of an hour after.

Post-mortem.—A quantity of partly coagulated, partly fluid blood poured out of the cavity of the mouth. The left lung, was highly emphysematous. Close below the bifurcation of the trachea and connected to the posterior walls of both bronchi, was a tumour, the size of a hen's egg, which was attached also to the anterior wall of the œsophagus. The commencement of the thoracic aorta was dilated into a sac, firmly connected to the chest walls and the vertebral column. An opening in the wall of the œsophagus, was found to be connected with a second small aneurism filled with blood clot. The principal aneurism was full of old firmly adherent coagulum. There was considerable destruction of the ribs and vertebral column; the spinal canal was exposed for three or four centimètres. The stomach contained an enormous mass of coagulated blood.

Paralysis of both serrati muscles.

This affection was observed in a baker, æt. 25, in whom the paralysis probably originated from over-exertion. The paresis had gradually become complete, and affected also other of the scapular muscles.

Ossification of the fascia of the back.[1]

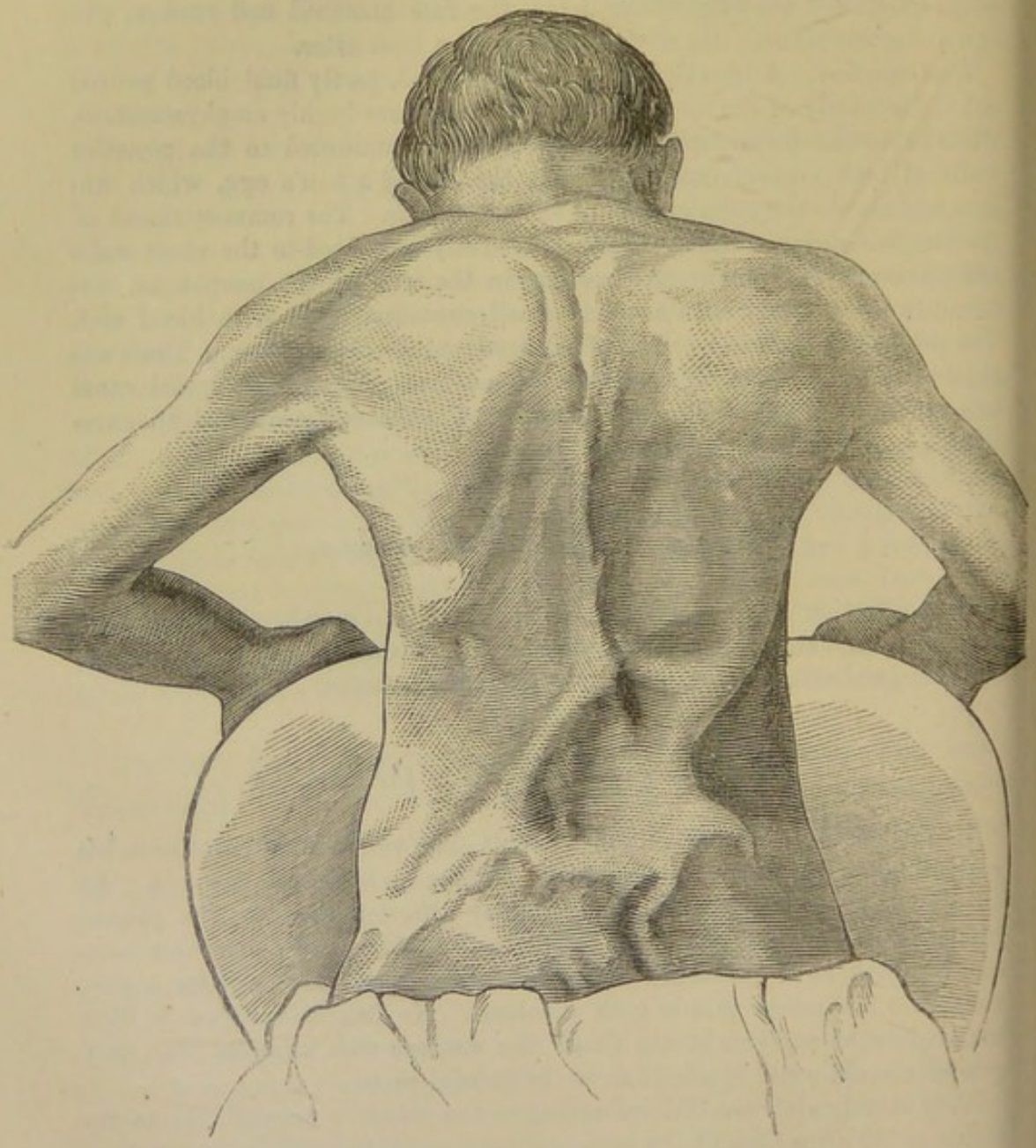
U. E—, of Zell, Ct. Zürich, about twenty-four years old, had, so far as his parents could remember, been perfectly healthy up to three years old. No hereditary tendency to this or any similar affection existed; the patient himself ascribed the origin of his condition to a fall when he was three years old, in which he alighted heavily on his outstretched hands, and for a long time after had severe pain in both shoulders. No dislocation seems to have taken place at any rate at the time; the surgeon who attended him only prescribed cold water applications to the painful parts.

Very shortly after the fall, according to the patient's account, the movements of the arms began to be more and more restricted, and in the course of some years the condition which existed on admission gradually developed (see Fig. 13). At first he was able to work in a manufactory, but eventually the limited movements of his arms prevented him from doing any work, so that for many years before admission he had been without any calling. It

[1] From a dissertation by Dr Zollinger, Zürich, 1867.

seemed possible that his condition was due to a previously existing diathesis, and that the injury, which apparently was not of a very serious nature, was but the exciting cause. If so, the case was analogous to those recorded by v. Testelin and Danbressi. The statements of the patient in such a matter, of course could not be unreservedly accepted, inasmuch as the disease

FIG. 13.—OSSIFICATION OF THE FASCIA OF THE BACK.



originated at such an early period of life that one could hardly expect the man to remember the minute symptoms of his complaint very distinctly. Up to three years before admission his health had been good; he then, however, was attacked by some severe illness, which confined him to bed for four weeks. The disease was marked by symptoms of severe fever, great pain on

both sides of the thorax, cough, dyspnœa and delirium. His medical attendant pronounced the affection to be inflammation of the lungs and of the brain. Probably, however, it was a case of severe pneumonia, with the so-called nervous symptoms. Complete recovery gradually followed, with the single exception that during convalescence the vision of his left eye became affected, and in a few days was completely lost, a most remarkable symptom to which we shall return later on.

During the two or three years previous to admission, the man stated that his condition had not appreciably altered; the process of ossification seemed to have become stationary, or at any rate, went on very slowly.

When admitted the patient was seen to be of stunted frame, ill-nourished, and of rather dull intelligence. When standing or walking, the body was flexed at the lumbar vertebræ. The head was craned forwards, and buried between the shoulders; the arms did not hang straight down from the shoulder-joints, but were somewhat abducted, and a little flexed at the elbows. On looking at the patient, the point that struck the eye most prominently was the number of abnormal inequalities and prominences of the back (see Fig. 13). Immediately beneath the skin, and taking, as it were, the lower part of the lumbar spine as a central point, numerous irregularly arranged flat surfaces, humps, and ridges of bony hardness could be felt, from which other similar flat ridges and spurs branched off in every direction. From this same central point, one especially hard, strong ridge extended outwards and downwards into the mass of the glutæus maximus muscle; at the end it broke up into numerous small processes, which branched off laterally in different directions, and—like the parent ridges—ended in three tolerably sharp-pointed extremities, lying free in the muscle. By introducing the point of the finger under these processes, and moving them about, they were found to be elastic, and could be bent from the points of attachment. Manipulation gave the patient no particular discomfort. On both sides of the vertebral column, over the sacro-spinalis muscle, were numerous perfectly immovable excrescences and bosses of bony hardness most irregular in arrangement. These latter ridges did not correspond to any particular muscular bundles, and were perfectly unsymmetrical on the two sides. On the whole, there was rather more disease on the left side than on the right. In the neighbourhood of the latissimus dorsi muscle, on either side, lay another bony mass, immediately below the skin; on the left side, the muscle felt as if its entire circumference were thickened and converted into bone. The inferior angle of the scapula could neither be seen nor felt, and appeared to have coalesced with the ossified muscle into a single mass. The lower edge of the latissimus dorsi was especially sharp where it forms the posterior boundary of the axilla. At this point the ossification abruptly ceased with a rounded off extremity, just before the muscle reached its point of insertion into the humerus.

In the deltoid—usually a favourite spot for pathological ossification—there was no especial bony hardness, but the insertion of the muscle into the humerus could be felt as an abnormally tense band; the more so that the panniculus adiposus was at this point but ill developed, and the rest of the

muscle was wasted. The same was the case with the pectoral muscles. No abnormal inequality or hardness existed at the sides and anterior surface of the thorax. From what has been said, it may be gathered that the movements of the arms at the shoulder-joints, although very limited, were not wholly absent. The humerus which was slightly abducted when in a position of repose, could be adducted to a certain extent though not completely crossed over on to the abdomen. Rotation of the humerus at the shoulder-joint was free, but gave rise to a curious phenomenon. As it was moved, the head of the humerus slipped hither and thither with trembling movements, as if there were some irregularities on its surface, and a sound resembling soft crepitus was distinctly audible at some distance. The explanation probably was that the separate muscular bundles of the deltoid were atrophied and the interstitial connective tissue increased. Thus the whole mass had become stiff, and perhaps adherent more or less to the capsule of the joint, and the irregularities of the dry cellular tissue, gave rise, on rotation of the head of the bone, to the quivering movements and grating sounds. The arm could not be completely extended at the elbow-joint, evidently owing to the tough and stiff condition of the biceps tendon. No material difference existed between the shoulder- and elbow-joints of the two sides. With the exception of a small, rounded exostosis on the second phalanx of the index finger, no other pathological ossification existed elsewhere in the upper extremities. The first phalangeal articulation of the left middle finger was restricted in its movement, owing to uniform thickening of the ends of the phalanges from bony or cartilaginous thickening. The movements of all the other joints of the hands and feet were perfectly normal.

With the exception of a small exostosis on the inner side of the left tibia, and a similar growth on the outer side of the condyle of the right femur there was nothing abnormal to be noted in the lower extremities, and the patient could, without inconvenience, walk for several hours. But the list of ossifications is not yet exhausted, for the movements of the lower jaw were much impaired, and it could only be depressed sufficiently to admit the little finger between the teeth. No hardness or irregularity could be felt from without in the muscles of mastication; probably, therefore, the defective movement was due to the tough and stiff condition of the articular ligaments. The affection of this articulation, as far as could be gathered from the patient, was of late occurrence.

The movements of the vertebral column were very partial; the patient was completely unable to straighten himself from his bent position. Lateral movements and rotation between the dorsal vertebræ were only possible to a very limited extent. Those of the cervical vertebræ were more free, but even here the movements were far below the normal; thus the power of bending back was almost completely absent, owing to the loss of extensibility in both sterno-mastoid muscles which stood out as prominent, rigid bands. Extending from the angle of the chin to the sterno-clavicular region were numerous tough, cord-like bands, obviously due to partial thickening of the interstitial cellular tissue in the platysma myoides.

Inspiration was kept up by means of the so-called auxiliary muscles of

respiration acting on the upper part of the thorax. At each deep inspiration, the thorax was distinctly raised; the action of the diaphragm, though not absent, was comparatively slight. This condition was explained by the immobility and rigidity of the false ribs, which prevented the displacement of the abdominal viscera. In this respect the case presented differed materially from that recorded by Skinner, in which the thorax was perfectly tranquil during respiration, all movement being prevented by the bony union of the ribs and thoracic muscles.

The cardiac sounds did not suggest any ossification of the muscular substance of the heart.

In other respects the patient had nothing to complain of, his appetite was excellent, and all the functions of the body were properly discharged; neither in the quantity nor constituents of the urine could anything abnormal be found.

With respect to the amaurosis of the left eye, the question arose—and it was a question very difficult to decide—whether the loss of vision had any connection with his attack of pneumonia. Prof. Horner, who saw the patient directly after the eye became affected, kindly sent to us the following information—"I found complete amaurosis of the left eye, so that he could only distinguish the movements of the hand when quite close; the ophthalmoscope showed complete optic atrophy, small vessels, and a very transparent lamina cribrosa. In the neighbourhood of the macula were small hæmorrhagic spots. Traces of absorbed extravasation were seen about the veins at the upper parts, and on or in the vessels were fine, white, glistening discrete dots, which seemed to be connected with some alteration of the walls of the vessels; below, about in the equator of the eye, was a round, chalky, glistening spot, over which passed a blood-vessel. In the right eye the outer half of the papilla was much flattened, and the lamina cribrosa remarkably defined. The inner part of the optic disc red in colour; field of vision normal." The connection of the complete atrophy of the left, and the partial atrophy of the right optic nerve, with the extensive processes of ossification about the body, it is not easy to explain: still, the supposition seems by no means improbable that the white spot seen in the left fundus was due to a calcareous deposit in the choroid. The unusually strong reflection of the brilliant white colour of this spot rather negatived the idea that it could have been due to pigmentary atrophy alone.

Cyst of the back.

A youth, æt. 16, came up to the Clinic with a fluctuating tumour, the size of a goose egg, close under the left scapula. This had been accidentally noticed some weeks before by a comrade, while he was bathing. I punctured the cyst, and let out a few ounces of clear, highly albuminous serum; microscopically, no structural elements could be observed. In three weeks, the growth had filled up again as large as before. I then punctured it again, and injected with equal parts of iodine and water. A good deal of effusion followed which was rapidly absorbed. Unfortunately I lost sight of the youth, and cannot say whether the cure was permanent.

Lipoma.

With regard to fatty tumours of the trunk, it may be worth notice that these, in most instances, were found on the back; their frequency in the female sex is evidenced by the fact that among twenty-seven cases, only four occurred in men.

Multiple soft fibromata. (*Fig.* 14).

G. A—, æt. 53. About thirty years previously a tumour weighing between four or five ounces had been removed from the chin. About the same date numerous soft small tumours developed in the skin, principally about the trunk. Most of the growths were no larger than a linseed, or a pea, but a few were of somewhat larger size. The long, pendulous tumour of the breast, with which he was admitted, developed on one of the small tumours. Six years previously it began to increase in size markedly and for a year or two had been growing with great rapidity. The growth was removed with the knife; the hæmorrhage was but slight, and recovery followed.[1]

Angioma.

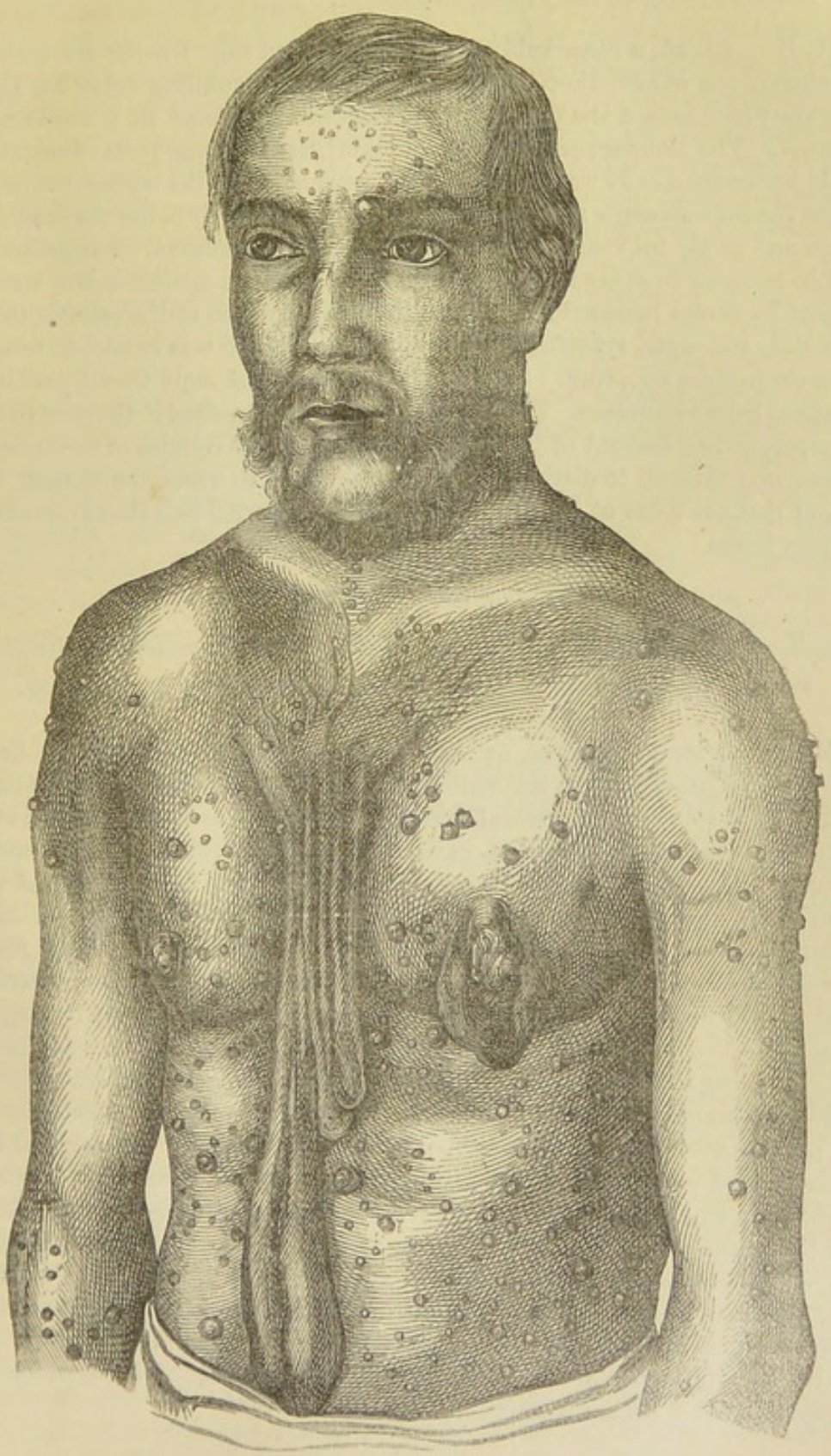
A man, æt. 43, had a racemose, pulsating, arterio-venous angioma the size of the hand on the right side. He had had since birth a vascular mole in this spot, which had gradually increased. For the last few years he had been troubled with repeated vomitings, and hæmorrhage from the nævus, and was greatly reduced, and anæmic. An elastic bandage was placed on the thorax above and below the growth. I was thus able to excise the growth, without any loss of blood. The wound was united by sutures, but a considerable collection of blood took place under them, and they had to be loosened, on account of commencing septic inflammation and suppuration in the neighbourhood. Repeated hæmorrhage followed with septic pleurisy, and he died six days after the operation.

Cavernous blood tumour, combined with a small lobulated lipoma.

I could not say in this case nor in another, which I once saw on the thigh, whether the fat formation (Rindfleisch), or the develop-

[1] The case is analogous to those described by Mr. G. D. Pollock in the 'Med.-Chir. Transactions,' vol. lvi, p. 255, and the 'Path. Soc. Transactions,' vol. xxvi, p. 219, as 'Fibroma molluscum.' Other references to the literature of the subject will be found at the end of a paper by Dr. Sangster in the 'Clin. Soc. Trans.,' vol. xiii, p. 166. The Museum of St. George's Hospital contains numerous drawings and photographs of patients with this affection and in the Catalogue of the Museum will be found further information. See also a case supra pp. 92, 93, Fig. 4.—[Ed.]

Fig 14.—Multiple Soft Fibromata.



ment of cavernous tissue (Lücke) was primary. Both new formations were in equal proportions throughout the entire tumour.

H. B—, æt. 26, a remarkably strong man, stated that five or six months previously one of his fellow-labourers had remarked a swelling below his right scapula which caused the bone to project from the thorax in a remarkable manner. The tumour seemed to be lobulated, and at some parts fluctuation could be detected. It was painless, and reached from the upper border to below the inferior angle of the scapula, so that it lay partly below the shoulder-blade and partly between that bone and the vertebral column. A large wound had to be made in order to remove the growth, and the operation was accompanied by severe hæmorrhage. Unhealthy suppuration of the cellular tissue followed, and septic symptoms. Constant wet packing was employed so as to promote profuse sweating. The patient recovered and more than a year later was free from recurrence. I should not have been surprised if the growth had recurred, for, on account of the severe bleeding and the collapse of the tumour, it was very difficult to distinguish the morbid growth from the normal fat, seeing that the lobes of the tumour extended far around into the surrounding adipose tissue.

Small-celled medullary sarcoma, in part spindle-celled, originating in the subcutaneous cellular tissue of the fascia of the back.

M. W—, a strong man, æt. 67, had previously enjoyed good health. Some nine months previously he had noticed a small tumour in the skin of the back, on the right side of the vertebral column; the growth became painful and the skin over it reddened, so that it gave the appearance of a slowly forming abscess. However, the growth constantly increased, and in the course of two months had reached the size of a fœtal head. The tumour was then completely removed, but soon after the wound had healed recurrence took place, whereupon it was removed a second time, five months after the first operation. Two months later, the man came under my care. The tumour had then again recurred in the form of numerous detached nodules lying close to each other and extending into the muscular, fatty and cellular tissues of the back. I extirpated the tumour thoroughly, removing a large portion of skin, together with the muscles and fascia in the neighbourhood of the growth. Scarcely had the wound healed when fresh recurrence took place in the cicatrix. I made a final attempt to save the patient by further extensive excision of the nodules and the parts around them, but I had to give up the attempt, for although the dissections extended down to the arches of the vertebræ, there still appeared suspicious spots deeper down still. The patient died of exhaustion a few months later. After death it was found that neither the axillary nor the bronchial glands, nor any of the organs were diseased. The duration of the disease was a little over fifteen months.

Melanotic small-celled and spindle-celled sarcoma.

R. G—, æt. 42. Two years previously she had noticed an excoriation on the left side of the back. Starting from this a tumour of a brownish colour developed, growing at first slowly, then more rapidly. The patient could not state whether there had been any previously existing pigmentation at this spot; on no other part of the body were there any such discolourations. When the growth had reached the size of a hen's egg, it was removed (fourteen months before she came under my care). The wound healed naturally enough, but when she came under observation, the cicatrix was of a brownish colour. Six months before admission, some tumours formed in the left axilla; some months later she had pains in the neighbourhood of the liver, and when admitted pain in the bladder, and pigment in the urine. She died of exhaustion a month after admission. The disease had lasted two years and two months. Post mortem: spindle-celled sarcoma was found in the left axilla, both lungs and pleura, the heart, liver, spleen, kidneys, intestine, omentum, urinary bladder, and on the outer surface of the uterus and ovaries. The peritoneum was covered with dark brown pigment but free from the growths. All the fat of the omentum and mesentery of a dark brown colour; six ounces of brown fluid in the abdominal cavity; pigmentary granules in the blood. Dr. Lehmann examined the pigment, and found in it ulmine (perhaps identical with or an altered form of Städler's "bilihumin").[1]

Sarcoma of the thoracic walls.

In a man, æt. 60, thirty-five years previously, a nodule appeared in the skin, close to the left nipple. In the course of ten years it had attained to

[1] A somewhat similar case, which is of interest as showing the extraordinary tendency to multiplication in some forms of melanotic sarcoma, came lately under the translator's observation. The patient, a woman, æt. 60, was admitted in June 1879, into St. George's Hospital for a mushroom-shaped growth on the back. This had developed on a scaly patch which she had had all her life. The growth was removed three months after its commencement, and proved, on microscopic examination, to be a melanotic alveolar sarcoma rich in pigment. Three months after removal a tumour appeared in the left axilla, and there was evidence of malignant disease of the pleura. Subsequently numerous other malignant nodules made their appearance, and she died of exhaustion, a little over a year after the first tumour was noticed. Post mortem: innumerable small, malignant growths were found in almost every part of the body; some fifty or more were scattered about the brain; about the pleura and peritoneum they were absolutely innumerable. Growths were found about the pericardium, the endocardium, the pancreas, uterus, liver, and many hundred in the subcutaneous tissue of the trunk, the neck, the groins, and arms. In the axillæ and the groins they occupied, obviously, the position of the lymphatic glands. The morbid growth had also recurred in the cicatrix of operation. [Ed.]

the size of a hen's egg, and was then removed. For twelve years he was free from recurrence, then a fresh growth appeared close to the scar, which after four years was again removed. For many years after this his health was excellent. Then however, several nodules appeared close to the scar and began to ulcerate. Caustics were applied, and he got quite well. Soon, however, the growth again recurred, and was allowed to attain the size of a man's head. It was then extirpated by Schuh, fifteen years before I saw him; the mass removed weighed six pounds. Before the extensive wound had completely healed, small nodules again made their appearance, which were removed three months after the last operation. For fourteen years after this he was perfectly free from any recurrence; the disease then returned in the cicatrix. He came under my care with a growth about the size of a hen's egg, from which severe hæmorrhage at times took place; at his earnest request I removed it. Fresh growth and ulceration took place in and about the cicatrix, which extended from the sternum, up over the shoulder, and at last proved fatal. From first to last, the disease had existed for thirty-six and a half years.

(The exact histological nature of the growth is not stated. [Ed.])

Section B.—Diseases of the Breast.

Case of neuralgia of the breast. Case of hypertrophy. Sub-mammary lipoma, simulating hypertrophy. Involution cyst of mamma. Remarks on adeno-fibroma of the breast. Case of cysto-sarcoma of very slow growth. Sarcoma developing in both breasts during pregnancy. Remarks on adeno-cysto-sarcoma. Case of melanotic carcinoma combined with alveolar sarcoma. Double carcinoma developing during pregnancy. Remarks on cases of cancer occurring at Zürich—at Vienna. Operative treatment of mammary cancer. Diseases of the male breast. Case of chronic induration—of carcinoma.

Neuralgia of the left breast.

Frau S. C—, æt. 58, had suffered from no previous disease of any severity. The menses commenced when she was seventeen, never gave any trouble, and had ceased four years before admission. She had been married thirty years, borne fifteen children, and had nursed four of them herself. When forty-eight years of age, without any known reason, pains of a shooting, gnawing character, commenced in the left mammary gland. The menses, which at that time had not ceased, had no influence on the pain. Six years previously she had consulted Schuh, who gave as his opinion that the pain was of a neuralgic character, and only at the urgent request of the patient consented to remove a great part of the left breast. The pain persisted in

the parts left as before. Two years later v. Pitha removed the painful portion of the gland, but again without benefit. When I saw her, there was only a small portion of the upper part of the gland remaining, chiefly consisting of fat, but in this, on minute examination, painful spots could be detected. On the supposition that these possibly might be small neuromata I removed the painful portion, but found in it no trace of anything abnormal. At first her sufferings were relieved, but the pain then returned in and about the cicatrix with all its former intensity.

This is the first case of neuralgia of the mamma, which I have had an opportunity of observing. As in the other cases which I have met with in surgical literature the patient was a highly hysterical woman, dark and stout. As long as she was compelled to busy herself in household affairs, and in attending to her husband, she seemed to be perfectly well; directly she was idle, or was reminded of her state of health, the pains occurred with severity. Gradually, her condition became intolerable to those round about her. She absolutely declined injections of morphia, stating that some time previously, as the result of an injection, she was brought into a state of great excitement followed by depression. She frequently consulted me, and I tried all kinds of remedies, none of which unfortunately gave her any benefit. I often had an impression that there was some insanity mixed up with her condition. Possibly these and similar conditions are only a form of intercostal neuralgia, usually depending on some central nervous affection; of course, cases where small painful tumours exist in the gland must be excepted.

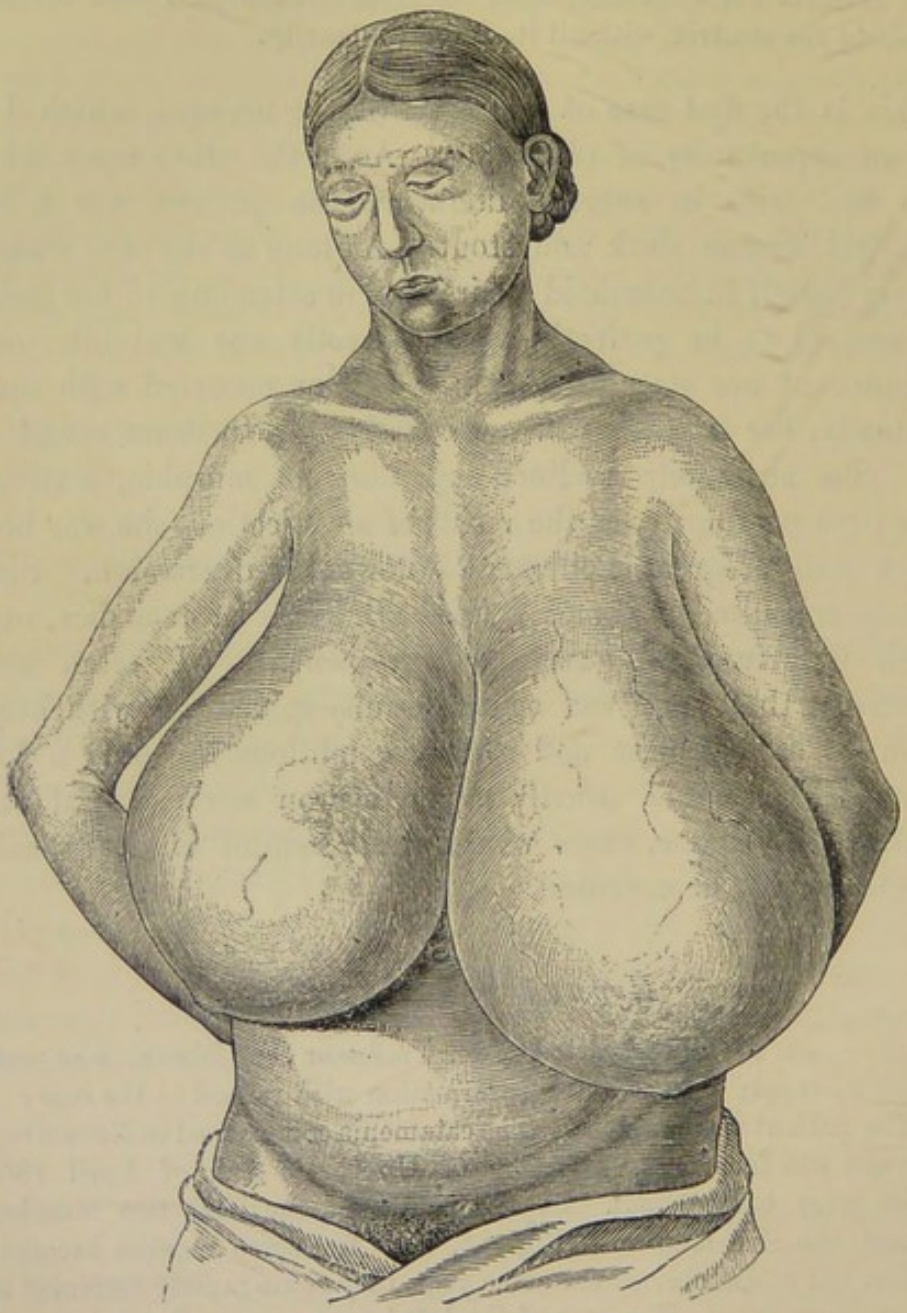
Hypertrophy of the mammæ.

M. S—, æt. 16, was admitted under Professor Carl Braun, who was kind enough to supply the following information with regard to the case:

"The patient was a virgin. The catamenia commenced in November 1867, when she was fourteen years of age. Up to the end of April 1868, the breasts were quite small. In the course of the next two months, they attained the size shown in Fig. 15, then for some months became much smaller, but in October of the same year, they again rapidly increased to their former dimensions. The base of the left breast measured 23 inches in circumference. The measurement from the lower edge of the third rib, at the attachment of the breast to the nipple was $10\frac{3}{4}$ inches; the transverse measurement 9 inches. The circumference of the base of the right breast was $19\frac{1}{2}$ inches. From the third rib to the nipple $9\frac{3}{4}$ inches, the transverse diameter $8\frac{1}{2}$. The measurements were taken when the breasts were hanging down. Two years later we heard that the breasts diminished considerably in

size during the winter and the spring, and the patient was able to do light work without difficulty. In the course of the summer, however, they again reached the size which they had on her previous admission. She refused to stay in hospital.

FIG. 15.—HYPERTROPHY OF THE BREASTS.



(It is noticeable that in this case, if we may judge by the illustration the nipples are situated at the lower part of the hypertrophied breasts, and not, as it usually found in this affection, directed upwards towards the clavicle. Cf. Birkett, in 'Holmes' System of Surg.,' vol. v, p. 238, 2nd. ed. [ED.])

Enormous hypertrophy of both mammæ.

A. R—, a servant girl, æt. 22, strongly built, and well-nourished, had always had good health as a child. The menses began when she was fifteen and had always been regular. When nineteen years old, she noticed a marked enlargement of both breasts; these gradually increased in size, without occasioning her any pain or material inconvenience. When admitted, she was found to be in about the fifth month of pregnancy, and the breasts had increased to such a prodigious size that she was quite unable to do any work. The mammæ reached down to the umbilicus, and were of immense thickness; the circumference of the left breast, at the base, measured sixty-five centimètres, and that of the right, sixty-eight; from the upper border to the lower, in a line with the nipple, the left measured sixty-three centimètres and the right sixty-seven; the greatest circumference of the left breast was eighty-two, and of the right eighty-four. The skin over the breasts was thickened, but not very intimately united with the glandular tissue. The subcutaneous venous plexuses showed extensively through the skin. The mass of the gland felt tough; in both breasts there were bosses of greater or less size not very distinctly differentiated. The breasts occasioned her no pain, but their weight was so great that she was forced constantly to keep her bed.

The idea of operation could hardly be entertained, when the enormous extent of the growth was considered, especially in the woman's condition. A compressive bandage was therefore applied daily; after a few days the right breast appeared to become somewhat softer. The pressure of the bandage had caused a slight excoriation of the skin, and she was attacked with severe erysipelas, commencing at that spot. The next day she aborted, became rapidly collapsed, and died in twenty-four hours.

On examination of the glands it was found that the hypertrophy did not consist of a pure hyperplasia, such as is commonly supposed to exist in these cases; but the enlargement was due to a number of fibromata of different sizes, some hard, some soft, enclosing glandular acini, the ducts of which—as usual in these tumours—were widened out into branching spaces. The cross section of the mamma resembled that of a uterus, studded with numerous fibromata, but the tumours were softer and contained more juice than ordinary uterine fibrous growths.

I may refer to my work on diseases of the breast ('von Pitha and Billroth's Chirurg.,' Band 3, Abth. ii, p. 85) for a case of immense lipoma, situated behind the right mamma. The case was diagnosed as hypertrophy of the breast, for the tumour had pushed forward the gland to such an extent that the nipple was situated at the lowest part of the tumour, into which the entire gland seemed to have disappeared.

Involution Cysts of the Mamma.

These tumours are exceedingly difficult to diagnose when occurring in large, fat women. As a rule, the surgeon expects to meet with carcinoma, and is extremely delighted to find that he has only to deal with the smooth-walled cysts. These cysts are certainly at times found in or near undoubted cancer. I saw three such cases, in all of which the cysts were rather larger than a hen's egg. Two I removed, on the supposition that they were carcinomatous. The third case is recorded below.

A woman, æt. 60, whose daughter I had operated on several times for cystic sarcoma of the breast, came under treatment for a slowly-growing cyst of the left breast. When I saw her, the growth was the size of a hen's egg, and had existed for many years. The old woman was blind and would not consent to an operation, so I punctured the cyst; it refilled, and I repeated the puncture, and injected equal parts of iodine and water. No resorption followed, but the opening of the puncture gave way after a few weeks, and some years later there was still purulent discharge from the sinus.

Adeno-fibromata.

I include under this heading the firm rounded or oval lobulated and encapsuled tumours, which on section are of a very pale reddish—almost white—colour. They nearly always include glandular tissue, but this has a very unimportant share in the new formation. As a rule the acini are scarcely enlarged, but the branching ducts are greatly elongated, and dilated into irregular slit-shaped spaces,[1] containing a little thin mucoid secretion. The slit-like spaces in these tumours are never converted into large cysts. The tissue itself consists of tough—usually fasciculated—granular connective-like tissue.[2] From the cut surface of these tumours, a little muco-serous fluid may be expressed; the tissue itself is for the most part dry.

1 'Billroth's Path.,' 624 *et seq.*

2 "The tissue of the neoplasia itself is usually composed of small, round, spindle-shaped—rarely of branched cells—with considerably developed fibrous, sometimes gelatinous, intercellular substance." Op. cit., 625.

There can be no doubt, that from a purely anatomical point of view, the difference between these tumours and cysto-sarcomata is very slight, and we should be perfectly justified in considering these tumours as representing the initial stage of cysto-sarcoma. Practical observation, however, allows us to form these new growths into a well-defined group from a clinical point of view. They are characterised by their very slow growth; their frequent occurrence in young women and girls; their painlessness, and not infrequent multiplicity, as well as by the fact that they do not appear to recur after operation.

It is a curious fact that I never once saw a case of this nature in Zürich. While in Berlin—during a period of seven years—I only observed five or six cases; all the observations that I have collected are drawn from Vienna, and the number would have been very much larger, if I had kept the record of cases that came under my notice in private. I commonly advised removal, if treatment with iodine for some months did no good; but I did not always advise operation very earnestly.

We cannot positively affirm, in answer to the usual question, that the tumour, if left untouched, will be directly dangerous to life. In two cases I have observed large cysto-sarcoma develop on some nodules of this description, which had remained for a long time indolent, and scarcely altered in size. It is far more common for carcinoma to make its appearance in connection with these tumours, when the women arrive at the age at which carcinoma occurs. In such cases I always advise removal, as also when stabbing pains occurred, or any rapid increase of growth was noticed.

Altogether nineteen cases of adeno-fibroma came under observation. Nine of the women were married; most of them had children, and had nursed one or more themselves; but, unfortunately, the records on this point are incomplete.

The age at which the tumours developed was as follows:—From 12 to 20, six cases; from 21 to 30, nine cases; from 38 to 40, four cases.

Cysto-sarcoma

E. S—, æt.43, unmarried, noticed first when she was nine years old a small, painless lump in the left breast; this increased slowly and in twenty-seven years had attained the size of a fist. It was then removed successfully by Schuh. A year later a fresh tumour appeared in the neigh-

bourhood of the cicatrix, and was again removed by Schuh, a year after the first operation, when it was the size of a hen's egg. According to the patient's account, both the tumours were called cysto-sarcoma. The growth again recurred in the cicatrix, and was removed two years later by Weinlechner; the wound again healed up, as is usually the case with cysto-sarcoma. In a year and eight months recurrence again took place in the cicatrix, and at the same time a tumour appeared in the right breast, which felt more nodulated and harder than that in the left. Both were painful and tender on pressure. I found a tumour the size of an apple in each breast; on the right side, a typical infiltrated alveolar carcinoma, with infiltration of the axillary glands; on the left side a typical cysto-sarcoma, without any enlargement of the axillary glands. I removed the whole of the right breast, together with the axillary glands, and extirpated the tumour on the left side (the fourth operation on the cysto-sarcoma). Examination of the growths proved the absolute accuracy of the diagnosis. She recovered very quickly, and was discharged thirteen days after the operation. We heard subsequently that she died rather suddenly after one day's illness; unfortunately, no post mortem was permitted, and the circumstances of her death were not detailed.

Sarcoma developing in both mammary glands during pregnancy.

Frau L—, came to me in May, 1869. She was then thirty-one years of age. She had had two children and became pregnant for the third time in November, 1868. In January, 1869, she noticed a swelling in the left breast, which was rather hard. From time to time slight serous discharge escaped from the nipple. She suffered no pain. She did not trouble about her condition, until the enlargement of the breast became considerable, and she felt herself weak and began to lose flesh, yet her general condition was not materially affected, and there was no disease of any internal organs.

In May, 1869, she consulted several surgeons in Vienna about her case. Different opinions were given—some counselled immediate amputation of the breast, while others were opposed to this. When she consulted me I found the left breast the size of a man's head, firm, and elastic; the skin over it was œdematous, the tumour freely movable on the thorax, and the axillary glands not enlarged. In the right breast also indurated nodules could be felt. The patient was of slight build and emaciated. I was against operation, as I did not think it probable that the patient would recover from the amputation of both breasts. Professor Carl v. Braun, whom we consulted, was of opinion that the induction of premature labour might perhaps be of benefit, for he thought that, as assuredly the tumour had developed during pregnancy, it might be the result of

some excessive physiological process, and there might possibly be some hope of its disappearing when lactation occurred.

Prof. v. Braun accordingly induced premature labour and delivered a seven months' child, which died soon after birth. The lying-in progressed normally, but no proper secretion of milk made its appearance. The patient had constant febrile symptoms; cough set in, with much viscid sputa; the appetite failed, and she died in a month of marasmus. Unfortunately, no post mortem was allowed, but I was able to remove some portions of both breasts for examination. The tissue was of a faint rose colour, soft and tough. Some milky-looking fluid could be pressed out from it. Microscopically the growths proved to be granulation sarcoma (glio-sarcoma, small round-celled sarcoma of Virchow).

Adeno-cysto-sarcoma.

In contrast to adeno-fibroma of the breast, where the tumours show such a striking similarity that, except for the size, and lobulation, one can scarcely be distinguished from another, the varieties of cysto-sarcoma are remarkably numerous. At one time the intercellular tissue resembles that of an œdematous fibroma, at another of a myxoma, at another of a giant and spindle-celled sarcoma, while occasionally the growths are of a small, round-celled —almost lymphoma-like—nature. Sometimes the cysts are large, sometimes small, and of the most diverse shapes; but nearly always contain mucoid fluid. Sometimes the cysts occur singly, while sometimes they occupy the greater part of the new formation; the cysts may be crammed full of growth or with perfectly smooth walls. Cases also have occurred to me though but rarely, where the growth contained newly-formed racemose and tubular gland structure.

These growths do not, as a rule, recur; at times, however, they do return after removal, sometimes as mere cysts, sometimes more in the form of sarcoma, and not only locally, for in two instances the axillary glands were affected.

The age at which the tumours developed was as follows:—At 19, one case; between 24 and 30, two cases; between 34 and 40, eight cases; between 41 and 50, five cases; at the age of 52, one case. Total nineteen cases.

In twelve of the patients on whom I operated, I learned that

from periods from two up to nine and a half years after the operation they were free from recurrence. Sarcoma, as is well known, is apt to recur locally, after long intervals of time. In this special class of cases, however, according to my present experience, if the growth does return, the recurrences follow one after the other at very short intervals. On one patient I operated five times for a purely local recurrence; the lymphatic glands were not implicated. Since then she has remained perfectly well. I thought, at the last operation, that I had removed the last remnants of the gland which in this case was not very extensive. A severe attack of erysipelas occurred after the operation, which she got over. At the time of writing, a year has passed since the operation, and no fresh recurrence has taken place; formerly her intervals of health seldom lasted longer than three months. In two other patients the axillary glands were also affected, and in one of these the lymphatic glands contained numerous cysts with muco-sanious contents. Such cysts in the axillary glands can only have originated by mucoid softening of new tissue, which tissue is the result of infection, and consists of giant, spindle, and star-shaped cells arranged in an alveolar form. Unfortunately, in this case the mammary tumour was not examined with sufficient minuteness to enable us to say whether the cystic formation in the mamma had itself originated in this manner, or whether it was the result of dilatation of the acini. In one case secondary growths took place in the ribs, pleura, and pericardium, and proved fatal. I was enabled to assure myself in this instance that the growth had not been mistaken for cancer, nor did carcinoma supervene.

Melanotic Carcinoma, combined with Alveolar Sarcoma.

While engaged in examination of these mammary tumours, the progress of which is very much like that of carcinoma, I was for a long time in doubt how to classify them. The dark pigmentation, and the arrangement of the large celled elements, partly in finely reticulated structure,[1] with the cells here and there firmly embedded in the alveoli, seemed to make it probable that they were of a sarcomatous nature. But the manner of extension of the growth, the

[1] 'Billroth's Path.,' p. 616.

rapid affection of the lymphatic glands, and the typical glandular form of the large cylindrical cells and cell-globules in other parts of the tumours,[1] seem to put it beyond question that the growths were true, rapidly growing mammary cancers. I can only suppose that these tumours represent a very intimate combination of carcinoma and sarcoma, with abundant epithelial proliferation, and metamorphosis of the stroma into the tissue of richly pigmented alveolar sarcoma.

Frau M—. æt. 68, had observed a tumour of the right breast for two years, which originated just below and external to the nipple. She had ten children, but had nursed none of them herself; menses regular from fourteen to fifty-three years of age. Beneath the right eye there was a dark blue nodule, the size of a lentil, which was stated to be congenital; her brother had a similar mark in the same situation; in the neighbourhood of the supra-spinous fossa she had another of these little dark nodules, also congenital. The patient was a spare, pale woman. On admission, the right mamma was the size of a child's head, hard, and united to the skin. A bunch of glands could be felt in the axilla; the entire tumour was removed, the operation being a very extensive one. Three months later the patient was discharged with the wound healed, but a small, bluish nodule infiltrating the skin had appeared on the right side of the back. Notwithstanding repeated persuasion, she declined to have this removed. The nodule developed into a tumour, and others originated in its neighbourhood; the immediate vicinity of the scar and the cicatrix remained free from disease, and the patient died of marasmus about a year after the operation. Unfortunately no post mortem was made. The disease altogether lasted four years.

Acute double carcinoma of the breast, developing during pregnancy.

Frau J—, æt. 36, the mother of seven children, gave the following history: —About five weeks previous to admission, she experienced sudden pain and tension in the breasts (very positively ascribed to eating some ice). At the time the breasts were about the normal size, corresponding to the eighth month of pregnancy. From this time both mammary glands increased rapidly in size and hardness. Seven days before she came under me, premature labour had been induced by Prof. Carl v. Braun, and she was delivered of a healthy child. Parturition was not attended by any serious hæmorrhage. The patient was of a spare frame and very pale; both breasts were rather larger than a child's head, semi-spherical, rigid, and covered over by tense, glistening skin, which was discoloured, and allowed the superficial vessels to show through clearly. The skin was so tense that the

[1] Op. cit., p. 615.

breasts were but little movable on the deeper parts. The tumours were of tough consistence and elastic in parts. No colostrum could be expressed from the nipples, and the axillary glands could not be felt. Pressure was applied to the breasts, but the patient became weaker every day, vomiting all food, and died a week after admission; the whole process, therefore, had only lasted six weeks. Post mortem: both mammary glands were found to be converted into lobulated, soft, reddish, degenerated masses, exuding on section a white milky fluid. The growths were firmly connected to the fascia over the great pectoral muscle by thickened, infiltrated, cellular material. Medullary nodules were found also in the thyroid gland, the pericardium, substance of the liver, large omentum, and the cortex of the kidney. This, in contrast to the previous case,[1] was distinctly of a carcinomatous nature.

Cancer of the Female Breast (Z. B.).

The number of my cases (49)[2] is naturally too small for me to be able to draw any statistical deductions of value with regard to the causes of origin of the disease. I may mention, however, that in six cases it was noted that after confinement a nodule had remained in the breast, which soon after became painful, and later on, developed into cancer. Nodules of this description often remain indolent for a long time (in three of my cases for four, eighteen, or thirty years respectively), and then, often without any known immediately exciting cause, rapidly increase and become painful. In one instance, a blow was given as the origin of the disease; in no other could any history of injury be traced. I am unable to say, from the somewhat scanty records of the cases, what relation the physiological function of the mammary glands bears to the development of cancer. In the Canton Zürich the women commonly have very ill-developed breasts. On this and many other social grounds, the mothers seldom nurse their children, but usually bring them up by hand. This is one of the principal reasons for the enormous mortality among children in the Canton Zürich. My records do not enable me to state positively in how many instances the patients have borne children, but from what has been said, it may be gathered that nearly all the women who had borne children and were affected with cancer of the breast had not nursed their offspring. These women work very hard in the fields, vineyards, and manufactories, so that they become prematurely old,

[1] Supra p. 212.

[2] This number refers to his practice at Zürich. [Ed.]

the more so that they are but ill fed. About Zürich it is the rarest thing to find stout strong women in the middle and lower labouring class. By the time they are forty-five, they are always grey-haired;[1] the menses usually commence late, and cease at an early age; chlorosis is very common among the girls working in the country and in the manufactories. The fact that the patients were usually described as thin, ill-nourished, and anæmic, does not bear any direct relation to the formation of cancer, but is a characteristic of the whole population.

The frequency with which cancer develops appears to me to bear neither a direct nor an indirect relation to the general nourishment of the body. I should not, from what I have observed hitherto, be prepared to make any positive statement on the subject; I have seen old, withered-up women with immense, rapidly-growing carcinomata; and other stout individuals with shrunken, long-existing scirrhous growths. Just as frequently, too, I have observed these conditions inverted.

Anatomically, a parallel may be drawn between the nodulated forms of cancer of the breast, and the tuberous rapidly growing forms of epithelial cancer; so likewise, the superficial, partly cicatrising epithelial cancers correspond to the contracted scirrhus of mammary glands. In cancer of the skin there is a decided difference in respect of the commencement of the two forms, according to the period of life, which is not the case in cancer of the breast.

Rodent ulcer is rarely seen in individuals under forty-five years of age; the hard shrunken breast cancer occurs by no means infrequently before this period. Purely individual idiosyncrasies seem to have some influence here, which has hitherto escaped observation. As for the age, at which cancers of the breast most commonly occur, an analysis of my small number of cases confirms what is already known. It has often occurred to me that cancer of the breast originating in young women grows more rapidly than when it is developed first at a later period of life. This is, however, not always the rule.

It may be gathered from my Zürich tables, that the disease most commonly occurs between the ages of thirty-five and sixty; at an earlier period, therefore, than cancer of the lip or skin, which

[1] In nearly every single case of scirrhus of the breast admitted into St. George's Hospital for a period of some sixteen months the hair had begun to turn grey about the time the tumour was first noticed. [Ed.]

most commonly attacks people between the ages of fifty and seventy. The development of cancer appears to be on the whole of earlier occurrence in women than in men. The majority of women affected with cancer of the breast died in about three years after the commencement of the disease. If the disease appeared between the ages of thirty and forty, it ran, as a rule, a more rapid course. Of the women between sixty and seventy, who were attacked two were carried off by the disease in less than a year. I have already stated my inability to give any information on the subject of hereditary tendency to the development of tumours.

With regard to the course of the disease and duration of life in those who died of cancer of the breast, any statements concerning the rapidity with which the axillary glands became affected would be of great value. But here observation is left altogether in the lurch. As a rule, the patients know nothing about the first commencement of the axillary swelling, or give very unreliable information. Most surgeons, too, deceive themselves on this point. The normal axillary glands are so soft that in general they cannot be felt even in very thin persons. If large glands can be felt, they are already diseased and, indeed, usually very extensively diseased. We often hear sympathetic, irritative glandular swellings spoken of in cases of cancer, by which is meant that the glands though enlarged are not yet cancerous. I grant that inflammatory, non-specific glandular enlargements may occur in cancer, especially in connection with the ulcerated forms. But it would be erroneous to suppose that they can be recognised by the external examination of the patient; more than this, they cannot always be distinguished on microscopical examination.

On this point I must refer to what I have said on the subject of cancer of the lip and face. The surgeon should regard any enlarged lymphatic gland in the neighbourhood of a cancer with the utmost suspicion and treat it accordingly. The lymphatic glands generally become affected very rapidly in diseases of the breast, and as early in the hard as in the soft cancers. To this rule, the highly-shrunken, scirrhous tumours of very old women form an exception. Anomalous cases, too, occur, such, for instance, as rapidly ulcerating mammary cancer, unaccompanied by disease of the lymphatics. It is possible that the position of the tumour in the breast influences the rapidity with which the axillary glands become affected; for instance, the growth may be situated close to

the gland, or in parts where the circulation of lymph is free, or the reverse. In the rare cases where nodules occur to the inner side of the nipple, enlargement of the lymphatic glands certainly takes place later. On the other hand, the glands are attacked with great rapidity—indeed, almost directly—when the nodules are situated on the outer side of and above the nipple.

The lymphatic glands of Mohrenheim's fossa, and those in the subclavian triangle, become affected secondarily, subsequent to the infection of the axillary glands. This is obviously connected with the course of the lymph and depends on purely mechanical conditions.

Among my forty-nine patients, the condition of the axillary glands was distinctly noticed in thirty-six cases; in twenty-four they were perceptibly diseased before the patients came for operation. In twelve no glands could be felt at the time of operation. In five of these patients, recurrence took place in the glands soon after the operation; undoubtedly germs of the disease existed at the time of operation. Some few patients presented themselves with numerous detached nodules in the skin and muscles about the tumour of the breast. These are the worst class of cases, and the most hopeless from an operative point of view. I was fortunate enough to meet with them but rarely at Zürich.

No estimate whatever can be formed of the period of time at which internal cancer is likely to occur after the development of primary tumours of the mamma and the axillary glands. Visceral disease was found in one case, in which the breast was affected eight months previously, and was absent in another, where the affection had existed at least twenty-two months. Carcinoma of the ribs, the substance of the heart, the pleura or the lungs, unquestionably originates from the direct passage of cancerous elements through the lymphatic vessels. It is remarkable that the development of nodules in the pleura comparatively seldom causes pain or effusion.

In fourteen cases I had an opportunity of examining, post mortem, women whom I had had under observation for cancer of the breast. In many cases where there was no autopsy it was possible to make a positive diagnosis during life. My experience with regard to internal cancer may be summarised as follows:—Twice no internal cancer whatever was found. In six cases nodules were found in both pleuræ and lungs; the ribs and the external surface of the

heart were each affected in one instance. In fifteen cases, nodules were found in the liver; twice in the vertebral column, twice in the brain, and twice in the upper part of the humerus.[1] The frequent association of cancer of the liver with a similar affection of the breast is striking. My idea is, that the cancerous material is directly transported through the lymphatic vessels of the mediastinum, diaphragm, and suspensory ligament of the liver. If this be so, we should expect to find cancer of the liver occurring more often when the right breast is affected. In a series of fifteen cases the right breast was affected in nine, and the left in six instances; the number of cases, however, is too small to enable me to speak positively on the point. Further, the lymphatic vessels surrounding the inferior vena cava, aorta, and œsophagus, where these pass through the diaphragm, may convey lymph containing cancerous elements to the liver. Or are we to look upon these growths in the liver as an expression of multiple cancer formation? Here is a field for much inquiry.

At Vienna my experience of the disease was much extended, and the following remarks relate to my practice there.

Of 238 cases of this disease, the affection began at the following ages:—From 26 to 30, twelve cases; 31 to 40, forty-three; 41 to 50, ninety-three; 51 to 60, fifty-eight; 61 to 70, thirty; 71 to 77, two. Total 238.

I may note, in connection with the above table, that in the rather numerous cases, where the cancer developed on nodules remaining in young women after confinement, the commencement of the disease is dated from the period when these indolent nodules began to be painful and increase.

In 236 cases it is recorded whether the patients were married, unmarried, or widows; the latter, whose number is small, I have included under the married, while some unmarried patients, who had

[1] In the 'Lancet' for June 12, 1880, p. 912, Mr. Snow has called attention to a thickening and tenderness of the upper part of the humerus, on the same side as the diseased gland, which, he states, is frequently seen in scirrhus of the breast. Mr. Snow ascribes the condition of the bone to a low form of periostitis; and has found the medulla affected in such cases. Since reading Mr. Snow's paper I have, among perhaps a dozen cases, observed the symptom twice. [Ed.]

had children, are also put down under the same head. From this table it results that cancer of the breast was seen in twenty-three unmarried, and 213 married. But even these figures do not show really that the unmarried have any security against the development of cancer, or again, that the married are especially predisposed thereto, for the proportion of the unmarried to the married, in the table of cases, corresponds pretty closely to the proportion of unmarried to the married generally. Again, of 209 married women who had cancer, 186 had borne children, while twentry-three were barren. Now, these figures again correspond generally to the proportion of fruitful to unfruitful women. Even from the best kept records, it cannot be made out how many of these women nursed their children themselves, or for how long; I must therefore leave the question undecided, whether the nursing or non-nursing of the children, or whether a long-continued or brief period of lactation predisposes to cancer formation; nor am I able to make any positive statement on the frequency with which mastitis has previously occurred in breasts that later become the seats of cancer.[1] It is far better to confess that we do not know anything for certain about these matters than to make mixed statements. That the disease is sometimes hereditary is beyond question, but even if minute statistics could be got out on this point, they would be incomplete, unless we were able also to discover whether the ancestors and blood relations had new formations in other parts of their organism, and especially whether any suffered from carcinoma. Even amongst the educated classes, such investigations meet with insuperable obstacles.

Of the further characteristics, and the histological nature of the cancers operated upon, I have seldom been able to find in the records accounts sufficiently precise to justify any general statement, beyond the fact that I am able to guarantee the accuracy of the diagnosis, "carcinoma." This much I can say with certainty, that of the above-mentioned 245 cases I only met with a single case of melanotic cancer, already described. In three instances the cancer developed simultaneously in both breasts, two being cases of cancer "en cuirasse." We often see that when carcinoma exists in one breast, towards the end it develops in both mammæ. I have already mentioned the frequency with which metastasis takes place

[1] Cf. Birkett, article in 'Holmes's Syst. Surg.,' 2nd ed., vol. v, p. 275, and Paget, 'Surg. Path.' 3rd ed., pp. 635 *et seq.*

in the vertebral column, while on the subject of diseases of that region.

Operations on the Breast and Diseased Axillary Glands.[1]

Of 118 operations on the breast alone, eight were fatal; the cause of death in all instances was erysipelas. Of 187 operations on the breast and the axillary glands, or (where recurrence took place) on the latter alone, forty patients died from various causes; three deaths occurred from severe secondary hæmorrhage, but many of the other cases, who were attacked with septicæmia, pyæmia, or erysipelas had also hæmorrhage from the axillæ. As regards this hæmorrhage, I may remark here, that I inherited from my teachers a great dread of ligaturing veins, especially large venous trunks. Formerly, therefore, whenever it was possible, I used to control the venous hæmorrhage with tampons, while in the worst cases I tied the branches close to the trunk, or else secured the wall of the vein and so partially tied the vessel. For a year I gave up this practice, and was in the habit of washing out the wounds with solution of chloride of zinc and concentrated solutions of carbolic acid in oil. Now, however, we know that all this is injurious, and that it is far less dangerous to place a double ligature on the axillary vein, and then divide the vessel between the ligatures. This plan is rarely followed by any œdema of the arm, a result which formerly was of very common occurrence. During the last few years, therefore, we have found much less risk in treating these cases. I cannot ignore the fact, that by our more modern methods of operating, where the skin is preserved as far as possible, so as to induce the wounds to unite quickly by first intention, recurrence seems to me to take place far more rapidly. Formerly, I used to remove all the skin of the breast in my cases. It is true the wound often took two or three months to heal, but the subsequent results—as far as recurrence is concerned—were far more favourable. In five cases I operated with chloride of zinc paste, or caustic arrowheads; one of these patients died of erysipelas. In five instances, also, I removed the entire mamma together with the tumour by means of the galvano-caustic loop. The immediate results of the operation are apt to mislead. No inflammation of the pleura ever followed the operation, but the

[1] 'Wiener Bericht,' 1876.

wounds, though at first they seemed small, were found to be very extensive after the separation of the eschar, and were frequently highly sensitive to the pressure of the bandage; moreover, they took a long time to heal. In one woman the cicatrix was thickened and sensitive three years after operation. On the whole, I cannot recommend these methods.

Operation, and Recurrence at the Seat of Operation.[1]

Amputation of the breast is, in general, not so very dangerous an operation, even when all the axillary glands that can be got at are removed. Of forty-six operations at Zürich, performed on thirty-eight individuals, seven died of erysipelas and pyæmia. This average is unfavourable, but would probably improve with a larger number of cases. In many instances, I was forced to expose the axillary vein or to ligature that vessel. Several times I have removed supra-clavicular glands. Formerly in some instances where there were small nodules, I used to practice partial excision of the gland, but lately I have given this up for the following reasons:—Whenever recurrence took place about the cicatrix, it started from the part of the gland which had been left; lately, therefore, I have always removed the entire mamma—or at least thought I did so; one is easily deceived on this point. It is exceedingly difficult to remove the entire mamma, since one cannot always know where it ceases. The glandular connective tissue generally loses itself in the fatty tissue, passing from the periphery of the gland to the centre, as it does also in every separate lobule. In an ordinary, not very extensive, operation for removal of the breast, a circle of glandular lobules nearly always remains behind in the fat. At the time of operation the structures can be neither seen nor felt; it is only by microscopical examination, and in properly prepared specimens that little acini can be detected embedded in the fat. Although, therefore, it may be our intention to extirpate the breast, we seldom remove it entirely and thus local recurrence frequently takes place. No surgeon of experience would gainsay the assertion that it is but seldom possible to completely extirpate all the lymphatic glands. Naturally we do not remove that which does not appear diseased to the sight or touch. Often and often a gland is left behind, in which some germ

[1] 'Zürich. Bericht,' 1860—1867.

of cancer is already deposited; this is sufficient to cause further infection. Operation would effect far more in mammary cancers if surgeons would but determine to excise unhesitatingly every suspicious nodule in the breast. On the slightest appearance of local recurrence the whole breast should be at once removed, and removed freely, together with every enlarged axillary gland; it would be better perhaps, when the nodules are growing rapidly, to remove the entire gland at the first operation. So long as surgeons are not convinced of the absolute necessity of his proceeding, and do not impress it on the laity, so long will the results of treatment fail to improve. Away with ointments and caustics; the one thing that can be of use in this disease is the knife in the hand of a skilful surgeon. No doubt cases will always occur where the growth is so rapid and the infection of the lymphatic glands and the blood so swift, that nothing avails, but in very many cases, if the treatment were different, benefit might be far more enduring, lasting perhaps sometimes for the rest of the patient's life. As the matter now stands between the profession and the public, the majority of women come up for operation far, far too late. This is proved especially by the many instances in which, after operation for mammary cancer, recurrence takes place both locally and in the lymphatic glands. Indeed, it is seldom possible to perform a complete operation, *i.e.* to remove the whole of the diseased part. *Ceterum censeo:* we can benefit these patients alone by operating on them far earlier than we are accustomed to do at present. Granted that even this is not possible in all instances, yet it is the case with many of these unfortunate women. A search through my records with a view to determine the duration of life after operation, shows that some died in from two to eight months; others lived from one and a quarter up to three and a quarter years after operation. Seven of the forty-nine cases were living when this was written, but with recurrence of the disease. One was still alive with recurrence three years after the operation; while six were alive without recurrence at periods varying from fifteen months to six years. I am sure that the experience of other surgeons must be very much the same; still, I am firmly convinced that the results would be better if the operations had been performed earlier.

It appears to me that we are on most points in the dark, with regard to cancer of the breast—this frequently-occurring disease. It matters not whether the patients be married or single, fruitful or

unfruitful, rich or poor, of full or slender habit, workers or idlers—neither the origin nor the course of the disease appears to be affected by any of these influences. What does influence the disease? Let us seek further, and we may discover.

Diseases of the Male Breast.

Chronic inflammatory induration of the male breast.

A youth, æt. 16, whose breasts were rather large on both sides, noticed three months before admission, without any known cause, some swelling and redness about the left nipple. The inflammatory symptoms lasted for about six weeks and then disappeared, but the swelling remained. The left breast was the size of a goose egg, hard, nodulated, perfectly moveable, intimately united to the nipple, but not implicating the skin; very slight tenderness on pressure. As the infiltration seemed to be the result of a previous inflammation, iodine ointment merely was applied. He came back again eight months later; there was then no distinct tumour to be seen, but the lobes of the left mammary gland were somewhat harder and more easily felt than on the right side; in both axillæ were some swollen, but not indurated glands. The general health was very good.

Carcinoma of the male breast. (The nature, microscopical or otherwise, is not stated.)

G. K—, æt. 62, had noticed for three months induration of the right nipple; the mammary gland on that side contained several tumours, the size of hazel-nuts. No enlargement of the axillary glands. The right mamma was removed, and eighteen months later he was well, and free from recurrence.

S. S—, æt. 68, stated that at least forty years previously, he noticed that the left nipple was much indrawn; the parts around swelled, and remained painful for some weeks; the pain and swelling then disappeared, but a hard nodule the size of a pea was left, close to the nipple. Three years before he was admitted, the nodule, which up till then had never occasioned him any annoyance, began to increase in size. In the left breast, the skin was glazed and tense over a convoluted mass of carcinoma the size of an orange; axillary glands free. The breast was removed, and he recovered.

In the case of A. B—, a small nodule made its appearance close to the left nipple, two years before I saw him, when he was seventy-one years of age. Gradually the entire mammary gland degenerated into a hard growth, the

size of an egg. He died of erysipelas, following operation for the removal of the tumour.

Carcinoma of the left breast and the axillary glands.

A. S—, æt. 42, had lived from 1848 to 1859 in Siberia, during most of which time he had suffered from scurvy. In 1859 he succeeded in making his escape and he then lived in his native Poland, in comfort. In the Polish revolutionary wars of 1867 he received several wounds. As the result of a wound of the chest, he suffered for a long time from empyema. (The wound was close to the left nipple and the bullet was only extracted after several months.) He then lived in Berlin, subsequently in Paris, in which latter place he was operated upon by Goslin for a partial empyema.

At the beginning of 1869 he noticed in the cicatrix in the left breast, and also in the left axilla, some small nodules, attended by occasional severe, radiating pains. The small tumours increased slowly but steadily, up to the time of admission; at that time the growth in the breast was about the circumference of half-a-crown, and that in the axilla about the size of a small apple. The breast and the axillary tumour were removed at the end of 1870, and a month later he was discharged.

The man came back to me three years later with some enlarged and indurated glands in the left axilla and severe pain down the left arm. The glands were removed. This was in 1873. I have not been able to learn the further sequel of the case.

CHAPTER XI.

INJURIES AND DISEASES OF THE ABDOMEN AND RECTUM.

Section A.—Injuries and Diseases of the Abdomen.

Cases of penetrating abdominal wounds. Case of rupture of abdominal muscle. Case of injury to stomach. Case of ruptured spleen—Death from other causes. Retro-peritoneal inflammation and abscess—Cases. Cases of villous cancer of pylorus, ulcerating through the abdominal walls. Encysted peritoneal effusion—Cases and Remarks: three doubtful cases of same affection. Case of volvulus. Cases of fibrous tumour of the abdominal walls. Cases of cancer of the omentum and pelvic viscera—Attempted removal.

Penetrating wounds of the abdomen.

In two cases of tolerably extensive abdominal wound, with escape of the intestine, which was uninjured, the gut was replaced, the wound united, and the patients recovered in a few days, without a trace of peritonitis. In a third case, a woman, æt. 27, had received a stab in the abdomen an inch and a half above the left superior spine of the ilium; here there was considerable protrusion of the omentum, which could not be reduced through the wound. This was enlarged, and the omentum replaced. Considerable hæmorrhage came from an artery in the abdominal wall. The patient died of peritonitis three days after the injury.

J. G—, æt. 31, a convict, attempted suicide in the following manner:—To the lower edge of the foot-board of his bed, he fastened a knife in such a way that the point was directed downwards. Then he placed blocks of wood beneath the feet, at the lower end; he then laid down under the bed, so that the point of the knife was immediately over the umbilicus, and knocked away the blocks, so that the knife was plunged into the abdomen. In this position he was found in the morning. The wound was united by sutures, and he was sent up to the hospital. He had vomited blood once. Acute peritonitis set in on the morning of the third day, and he died shortly after.

Post mortem: two very small perforating wounds were found on the larger curvature in the stomach; peritoneum very hyperæmic; very slight effusion.

H. W—, æt. 32, a very unintellectual man, was admitted with the following history:—About two years previously he fell on a stake, and received a wound three fingers' breadth, below the navel. He stated that some fat protruded, which he cut off himself with a pair of scissors. The wound soon healed up. The cicatrix bulged forwards to some extent, but gave him no pain. Four days before admission he fell from a hay loft and struck himself on the abdomen. When he had recovered, he noticed some blood on his trousers. The cicatrix had been ruptured, and the omentum protruded. When I saw him the protrusion was granulating, he was quite free from fever, and there was no trace of peritonitis. The protrusion was covered with an oiled pad of lint; gradually it shrank up, and was retracted into the abdomen in thirty days after the injury.

This last case speaks strongly against the reposition of prolapsed omentum, while the case mentioned above shows the bad result following dilation of the wound and reduction of omental protrusion.

Subcutaneous interstitial rupture of an abdominal muscle.

A strong young man, æt. 22, in attempting to save himself from falling backwards as he sprang from a cart, felt intense pain in the abdominal wall. The pain persisted for some days with such severity that the patient was unable to draw himself upright. In the course of a week it gradually disappeared.

In the following case I diagnosed an injury of the stomach; complete recovery followed.

J. B—, a labourer, æt. 38, was at work in a narrow trench about twelve feet deep, the side of which fell in. The patient, who was found in a stooping position, was promptly dug out, and brought up in an unconscious condition to the hospital. When admitted, he was collapsed, cold, and pulseless, with extensive superficial excoriations over many parts of the body, and subcutaneous extravasations on the back and the left upper arm; the abdomen was a little distended, and rather painful. Consciousness shortly returned. Towards evening the patient vomited several times blood and remnants of food; this repeatedly occurred on the next day also. The vomit always contained recent blood. The region of the stomach was painful on pressure. Great distension for the first two days; the hæmatemesis then diminished, finally ceasing on the third day; the pain disappeared at the same time and the distension gradually subsided entirely.

The following case of head injury may be here mentioned,

although the rupture of the spleen found post mortem was only of secondary importance.

G. B—, æt. 43, lost his balance and fell down two flights of stairs on to the pavement. He died five days after the injury, evidently from commencing suppurative encephalitis, the result of a separation of the lamboid suture, and cerebral injuries. The spleen was found enlarged to thrice its normal size, and partly adherent to the diaphragm. On the upper surface the capsule was torn, and the parenchyma of the organ traversed in its whole thickness by a rent, full of loose blood-clot.

From the appearance of the rent, and the small quantity of blood effused, we concluded that this injury might have healed up completely.

Retro-peritoneal Inflammation with the Formation of Abscess.

These are commonly called psoas abscesses (congestive abscesses arising in connection with disease of the vertebral column are here excluded), but the substance of the psoas muscle is seldom the starting point of these inflammations. In the majority of cases, the pus is formed in the retro-peritoneal cellular tissue in the neighbourhood of the pelvis; seldom above this level. (The disease is known in England as retro-peritoneal cellulitis.)

The substance of the psoas muscle may become involved in the suppuration, and the periosteum of the pelvis, with the processes or bodies of the vertebræ, be partially eroded; these changes, however, are so slight in cases where the cellular tissue is primarily inflamed that they can readily be distinguished after death from primary periostitis and ostitis of the spinal column and pelvis. In such inflammations a tolerably good prognosis can be given only when they originate in connection with the puerperal state. The abscesses which arise in this situation from other causes are always serious, and in weakly individuals highly dangerous to life.

In the case of a child, who was in a very low condition from multiple periostitis of the extremities, an attack of severe abdominal pain, accompanied by flatulent distension, occurred. The umbilicus then began to bulge forward, and finally an enormous amount of pus escaped through it. The patient was taken away, so that I was unable to find out the source of the suppuration.

Elizabeth K—, æt. 43, had suffered previously from suppuration of the cervical lymphatic glands, and erysipelas; subsequently she had abscesses in the sole of the right foot, below the right clavicle, and over the seventh and eighth ribs. Six weeks before she was admitted, she complained of pain in the right thigh, contraction of the lower limb, and abdominal swelling. On examination, a retro-peritoneal tumour, the size of a man's head, was discovered in the abdomen. We observed the swelling gradually descend from day to day to the inner side of the right thigh. She had no disease of the vertebral column. At her own request she left the hospital in this condition; then for five weeks she was compelled to keep her bed at home, and suffered for a long time from severe diarrhœa. Gradually the tumour became less and less, the movements of the leg became more free, the strength returned, and she recovered completely.

It was doubtful in this case whether the collection of pus, which certainly existed, made its way through the intestines and so escaped during her attack of diarrhœa, or whether it was absorbed. Considering the large size of the collection, the latter supposition seems highly improbable.

Caspar F., æt. 33, had suffered from chronic suppuration, and periostitis of one of the metacarpal bones, seven years previously. Two years later he had severe pain in the pelvis, rapidly increasing to such an extent, that it prevented him from getting about; both thighs were flexed. He gradually recovered, and began to move about a little on crutches, and in the course of two years, was able again to walk quite uprightly. For some time then he remained perfectly well. A month before admission he was attacked with a severe rigor, and the next day felt lancinating pains in the region of the left hip. The leg again became drawn up, and he was forced to adopt a stooping mode of progression; for some few days before admission he had pains also in the right hip. Retro-peritoneal abscesses could be felt on both sides, just above Poupart's ligament. These broke, and he died in consequence of the extensive suppuration. Post mortem: retro-peritoneal abscesses were found on both sides, extending along the psoas up to the twelfth dorsal vertebræ. The abscesses did not communicate with each other nor with the vertebræ, nor were the bones of the pelvis diseased.

The following case, which was at one time supposed to be an abscess in the abdominal wall, may here be recorded:

M. S—, æt. 68, had noticed about a month before admission, a painful swelling a little to the left of the umbilicus. No cause could be assigned for its commencement. At the outset it was not painful on pressure, but occasioned merely some shooting pain in walking. The patient was a well-nourished spare woman, and with the exception of this local trouble, was in tolerable health. The tumour lay in the abdominal walls, like a disc, and had almost exactly the appearance of a moderate sized boil.

I supposed that it was a case of abscess of the abdominal walls, and as fluctuation was distinct at the upper part, I attempted to confirm my diagnosis by making an incision. About a couple of ounces of broken down substance, mixed with pus and blood, escaped. The abscess refused to close. Instead of pus, a thin, ill-smelling secretion escaped, and the infiltration of the surrounding parts increased. The patient lost appetite, and wasted. I then rather inclined to the view that it was a case of central softening sarcoma of the abdominal walls. On examining microscopically some of the granulations, I found undoubted elements of alveolar cancer (Drüsen Carcinoma). I now thought that the case must be one of gastric cancer which had broken through the abdominal wall. But this view was given up, inasmuch as no food ever came out through the opening. During the whole course of the disease she never had any vomiting. Death took place finally from exhaustion, no fresh symptoms having occurred to assist the diagnosis. Post mortem: we found a medullary villous carcinoma of the pylorus, which had made its way externally. A probe could be passed from without into the stomach, yet none of the contents of the stomach had ever escaped.

Encysted peritoneal effusion.

Graf von M—, a stout, well-nourished man, æt. 32, consulted me and some of my colleagues in April, 1870. Unfortunately, I have no minute record of the history of the case, beyond the fact that the patient had been perfectly well up to three months previously, and that the first symptom of the disease was some fulness of the upper part of the abdomen. On examination, a fluctuating tumour rather larger than a child's head was found, intimately connected to the right lobe of the liver.

Two of my colleagues were of opinion that the case was one of hydatid tumour, a view which seemed to be confirmed by the painless, though constant growth of the swelling. The circumference of the liver, however, appeared to have increased with remarkable rapidity for a hydatid. The distension of the abdomen, when we saw him, was so great that the patient's breathing and sleep were much interfered with. The functions of the bowels, too, were impaired; the patient was emaciated, and lost strength from day to day, so that he was no longer able to stand. He urgently requested that some decided treatment might be adopted, as, in the condition that he was, he felt that he could not last long. At a consultation with my colleagues, von Dumreicher and von Pitha, we decided unanimously that the case was undoubtedly one of hydatid tumour of the liver. We agreed, also, that the patient must shortly die, unless some

operation was undertaken; at the same time we did not conceal from him the risk of such a proceeding. So convinced were we of the correctness of our diagnosis, that we considered an exploratory puncture to be only waste of time. To attempt a radical cure with injection of iodine, seemed to us inadvisable on account of the immense size of the tumour. The absorption of iodine from so large a surface might have led to fatal poisoning, and the injection of a weak solution would have been of no avail. Simon's method of double puncture with subsequent incision appeared to us the best method of opening the cyst; at the same time we were gravely anxious about the large suppurating surface that would thus be caused in the interior of the abdomen, fearing that febrile marasmus might bring about the same result which sometimes follows this method of treating ovarian cysts. The patient caught eagerly at the suggestion of an operation which might probably save his life. We operated on him a few days later, when his condition was as follows:

The abdomen was enormously distended, especially at the upper part, and bulged forward in a spherical form over the pit of the stomach and left lobe of the liver. Fluctuation was distinct over the whole abdomen, the wave being communicated upwards and downwards as well as from side to side. Dulness on percussion commenced anteriorly, laterally and posteriorly at the level of the nipple, and extended over the whole abdomen. A small part only below the heart, which was in its normal situation, was resonant (owing to the distended stomach), and below on the left side (owing to the distended intestines): the position of the diaphragm was scarcely altered. The respiratory movements did not perceptibly affect the position of the tumour; the extent of the dulness was the same, whether he lay down or stood up. I made a puncture in a vertical line with the nipple, just below the edge of the ribs, employing a highly curved trochar, which was plunged in at the spot mentioned, and brought out again at about two inches distance. On the summit of the curve in the canula there was an opening. After the stilet was removed, one of the terminal openings of the trocar was closed with a plug: to the other end a long caoutchouc tube was attached, through which the fluid was allowed to flow off. Thirty-eight pints were drawn off in this manner. I abstained from applying any pressure to the abdomen, and closed the opening in the canula as soon as the flow began to slacken. The next day I evacuated about eight pints, and the day after that again four pints of fluid of the same nature as at the first tapping.

The fluid was found to be of a greenish-yellow colour, not translucent, and highly viscid. The sediment was very small in amount, of a yellowish colour, and contained a few conglomerate, highly-

refracting, minute lobules, which were seen also floating about singly; these were evidently the remnants of completely shrunken coloured blood-cells. The fluid was faintly alkaline, and on boiling was converted into a white flocculent mass.

The fluid was so markedly unlike that of a hydatid, and it was so entirely different to any that I had previously met with, that to my mind, the accuracy of our diagnosis seemed already to be a matter of doubt. A further analysis at the chemico-pathological department of the hospital yielded little more than negative results. The fluid proved to be rich in albumin, and contained a considerable quantity of sugar, a little urea, and a trace of succinic acid and indican. In order to make the result of our puncture agree with the diagnosis of a hydatid of the liver it was necessary to suppose that the animal had died, and that a secondary effusion had thereupon taken place into the cyst. From the nature of the fluid we might indeed have concluded that it was some exceptionally thick, dropsical effusion, but there was no ascites. The manner in which the growth had originated, pointed to a tumour distinctly localised in the liver at the outset, or at any rate to some well-defined growth. Could it be a circumscribed peritoneal effusion, without a trace of pus, and where not the slightest symptom of peritonitis had ever existed? Could it be due to tubercular peritonitis? Such suppositions seemed in the highest degree improbable in the case of a cavalry officer whose previous health had always been good.

On percussing the abdomen three days later, a further puzzle presented itself. All the intestines had, speaking generally, returned to their normal positions. In the left hypochondrium, however, was an area of dulness, the extent of the hand; close above the trochar, which was still *in sitû*, and just where the liver must have been situated, was a small space, where the percussion note was markedly resonant. I forbear from recording all the conjectural diagnoses and the views that were expressed. I need only say that eventually we adopted our first opinion that the case was one of hydatid with, however, the above-mentioned modification. Accordingly, the treatment was carried further; our idea was, to leave the canula *in sitû* for about a week; we supposed that by that time the sac of the hydatid would become united to the abdominal wall; an india-rubber tube was then to be passed through the canula, and after the latter had been removed, was to be fastened on

the abdominal wall, and gradually tightened until it cut its way through the portion of the abdominal wall which lay between the two openings. The cavity during the meanwhile was to be washed out daily. Our only dread, besides acute peritonitis, was lest exhaustion should supervene from the suppuration of so large a cavity.

Of local reaction after the operation there was practically none; on the second day, moderate fever set in, which entirely disappeared by the sixth day, and the patient then was free from fever up till the end of the fourth week. On the sixth day after the operation, I removed the canula, and left in a drainage tube. The opening had to be repeatedly dilated with sponge tents, in order to allow the constant discharge of the secretion. The nature of the fluid was different to what we had expected. It was thin, seldom had any ill smell, did not become really purulent, and ceased to be discharged at the beginning of the fourth week. The tube was then removed and both openings closed up shortly after.

While all this was going on, the patient was attacked with rather severe bronchial catarrh. For a while I conceived it to be possible that tuberculosis of the lungs had been developing and that the abdominal affection might be connected with peritoneal disease. However, the bronchial catarrh disappeared, and after repeated examination of the thorax, I gave up this idea. The progress of the case after the operation, and the healing of this immense cyst, which had evidently occupied the right side of the abdomen, gave us great satisfaction: but the feeling was short lived. The abdomen again began to enlarge, and repeated examinations showed clearly that the area of dulness already mentioned was daily increasing in size. Shortly afterwards it assumed the appearance of a rounded swelling; at the commencement of the fifth week, feverish symptoms again came on rapidly, and the general condition deteriorated.

This new formed tumour yielded distinct fluctuation; it was painless and fixed; what was it? At a further consultation we came to the conclusion that a second hydatid cyst, which must have been masked by the previous one, had rapidly developed.

The swelling was punctured and ten pints of thin fluid, of the same nature as on the former occasion, were evacuated. It was evidently impossible to evacuate the sac entirely, as the fluid appeared to be enclosed in numerous deeply situated cysts. Slight relief followed, but the patient from this time forth was never entirely free from febrile symptoms.

I now abandoned entirely the idea that the case was one of hydatid tumour; however, I was unable to form any other diagnosis.

The patient now rapidly lost strength, although he was placed under the most favourable conditions. The abdomen rapidly increased in size again, especially at the lower part on the left side. I punctured again at this spot, but did not succeed in evacuating much fluid. The fever increased, and he died three months after I first saw him.

The post-mortem examination revealed chronic peritonitis, with encysted serous effusions. The intestines were adherent together, partly by cellular tissue, partly by fibrous bands. We were unable to find any cause for the condition. My supposition that the process might have been due to miliary tuberculosis, was negatived by the fact that no trace of tubercle could be found anywhere in the body.

The case was an obscure one, in its origin as well as in its progress. Oppolzer, who has perhaps the largest experience of any living physician of abdominal diseases, told me that he had never seen a similar case.

With regard to the operative proceedings, it may be remarked that the double puncture was unnecessary; one would have been quite sufficient. It is noteworthy that the canula remained in the abdominal cavity for a week without exciting any appreciable local irritation. The punctures relieved the patient, and prolonged his life, or, at any rate, did no harm. The collection of fluid caused the patient so much discomfort that the two first punctures must have been made, even if we had diagnosed the case aright.

Rare cases seldom occur singly. Not long after I met with a similar case to the above, which I was enabled to diagnose correctly, and where I punctured only once. The patient, however, died of exhaustion.

The four following cases were probably of the same nature, though we had no opportunity of positively verifying the diagnosis:

T. M—, æt. 21, a powerful man, was admitted with a prominent bulging of the lower part of the abdomen, just above the symphysis pubis. On palpation, a tolerably resistant tumour, the size of a fœtal head and firmly connected to the symphysis, could be felt. The swelling was painless, and lay immediately behind the abdominal wall with which it was connected. The bladder and the bowels acted normally, and a catheter passed easily. Nothing of the tumour could be made out through the rectum. The patient could state nothing positively about the origin of the tumour, which caused him no trouble; he had noticed it for about eight days, but could not say whether it had developed slowly or quickly.

The tumour was so markedly consistent, and its shape so rounded and sharply defined, that at the first glance it was impossible to avoid the conclusion that it was a fibroma or chondroma. Taking into consideration the highly unreliable character of the patient's account, the unfavourable prospects of any operation, and the absence of any discomfort, expectant treatment seemed desirable. As it was thought possible that the swelling might be an extravasation of blood between the peritoneum and abdominal wall, or might be merely due to effusion, mercurial inunction was employed, and warm fomentations applied. Under this treatment the tumour rapidly diminished, and in a fortnight was so small that it could scarcely be felt.

J. J—, a chaplain, æt. 35, stated that he had suffered for about nine months from symptoms of indigestion; occasional vomiting, and attacks of heartburn were the principal symptoms. Eight months before admission he had a severe attack of colic, which, according to the report of his medical attendant, was complicated with peritonitis. He was confined to bed for six weeks, and recovered slowly, but completely. Some months before his admission he remarked a sensation of fulness in the abdomen, and for a few weeks he had noticed an abnormal swelling in the lower part of the belly. I found an encysted, fluctuating tumour, fully the size of a man's head, in the umbilical region. Two litres of thin, dark brown fluid were evacuated by means of the aspirator. Microscopical examination of this fluid showed large numbers of granular cells, coloured blood-corpuscles, crystals of cholesterine, and granular débris. The patient was discharged four days later, much relieved. Deeper down, however, a swelling was perceptible, which had somewhat increased in circumference since the puncture. This swelling extended forwards so rapidly that the patient returned to the hospital within three weeks, with the tumour as large as it was before the operation. Puncture was repeated, and 1600 cc. of the same fluid as before withdrawn. I heard a year later that the rest of the swelling had completely disappeared spontaneously, and that the patient was in perfect health.

B. H—, æt. 30, had noticed an increase in the size of her abdomen for about a year. She had no pain, and was able, though with some difficulty, to do her work. As she began to lose flesh, and some swelling of the feet occurred, she came under treatment. The case had been diagnosed as one of ovarian tumour. The abdomen was much enlarged, the circumference at the level of the umbilicus being 125 ctm., and from the xiphoid appendix to the symphysis pubis, 95 ctm. Examination by percussion made the diagnosis of encysted peritoneal effusion highly probable; no reason could be assigned, however, for its origin.

The abdomen was punctured at several points, and altogther 2500 cc. of highly albuminous, yellow, viscid fluid were evacuated. The patient was then transferred to another part of the hospital, and I was unable to obtain any further record of her case.

Elizabeth A—, æt. 10, was stated by her parents to have suffered from typhus five weeks before her admission. Eight days before she came under my care a painful swelling was remarked, extending from the umbilicus deep down into the abdomen. The skin about the umbilicus was reddened, very thin, and bulged prominently forward. The abscess was opened by a small incision, and about two and a half pints of thin, greenish pus escaped. Convalescence was delayed by an attack of diarrhœa, but the abscess healed up in about six weeks. There was still slight dulness in the neighbourhood of the cicatrix when she was discharged.

Volvulus.

A woman, æt. 59, was admitted with symptoms of severe ileus, which had existed for twenty-four hours; she had also an inguinal hernia, which, however, was found to be perfectly moveable and flaccid. The condition of collapse precluded any operation, and the patient died in a few hours. Post mortem: volvulus of the greater part of the ileum was found.

Fibrous tumour of the abdominal walls.

Josephine W—, mother of several children, was admitted with a fibroma, the size of a man's head, situated in the middle line just beneath the umbilicus; the tumour had commenced nine months previously, when she was thirty-four years old. The patient had been confined five months before admission. The growth of the tumour had been particularly rapid during the pregnancy. I removed the tumour, separating the thin layer of the peritoneum over a space the size of the palm of the hand, from its under surface. No recurrence had taken place nearly four years after.

Emilie E—, æt. 24, the mother of several children, had a fibroma which had commenced two years previously. The tumour was the size of a fœtal head and situated just to the right of the umbilicus. A small portion of the peritoneum was cut away in removing the growth. Four and a half years later, she had no recurrence.

Etiologically it is worthy of note that these fascial tumours were nearly always observed in women who had been several times pregnant.

Carcinoma of the omentum and the pelvic viscera.

Two cases of this nature came under observation, in women aged respectively twenty-eight and forty-one. In one case, the tumour

was correctly diagnosed to be situated in the omentum; in the other, no precise diagnosis could be formed. In both there was marked ascites. Both cases were operated on, the operation in each instance lasting about two hours. One of the patients died of anæmia in eighteen hours, the other was carried off by peritonitis in six days. The entire peritoneum, the superficial surface of the intestines, ovaries and uterus, were studded with small nodules, whose existence was of course only revealed on the removal of the large omental tumour, which was universally adherent. The peritoneum becomes involved so rapidly in such cases, that there is no hope of removing all the diseased parts completely, by operation; even if this were possible, there would be no prospect of any lasting benefit. In fact, these cases are so utterly hopeless, that were I, as the result of a mistaken diagnosis, to meet with another, I should at once close the wound.

Section B.—Hernia.

Hernia of the umbilical cord—Cases. Umbilical hernia and congenital fæcal fistula. Ventral hernia. Phrenic hernia. Case of incarcerated ventral hernia; death. Case of internal strangulation; abdominal section; death—Remarks. Cases with symptoms of strangulation; inflamed empty hernial sac; hernia purulenta; peritonitis from typhus (?) ulcer; strangulated testis. Case of umbilical hernia; gangrene of gut. Remarks on strangulated hernia; treatment. Case of fæcal and vesical fistula after femoral hernia. Case of fæcal fistula after hernia: ditto, treated by plastic operation. Case of artificial anus cured by entérotome. Case of strangulated vermiform appendix. Case of femoral Littre's hernia. General remarks on strangulated hernia.

Hernia of the Umbilical Cord. (Nabelschnurhernia).

Two cases of this nature occurring in new born children came under treatment; one child recovered perfectly, the other died of

incarceration. These are the first two cases in which I had the opportunity of observing the natural process of healing of this malformation, as described at length by Rose. In neither case was anything done, beyond applying a pad of oiled linen and a compress so as to protect the hernia from external injury. In the first case the hernia was as large as a good-sized apple; the portion of the umbilical cord (vagina funiculi umbilicalis) overlying the intestine dried up in the course of ten days. By this time the protruding intestine was covered by fibrinous adhesions, which gradually changed to a granulating surface. The subsequent shrinking and cicatrisation brought about the gradual reduction of the intestine. Eventually, a cicatrix about the size of a florin was left at the umbilicus, over which a flat pad and compress were fitted.

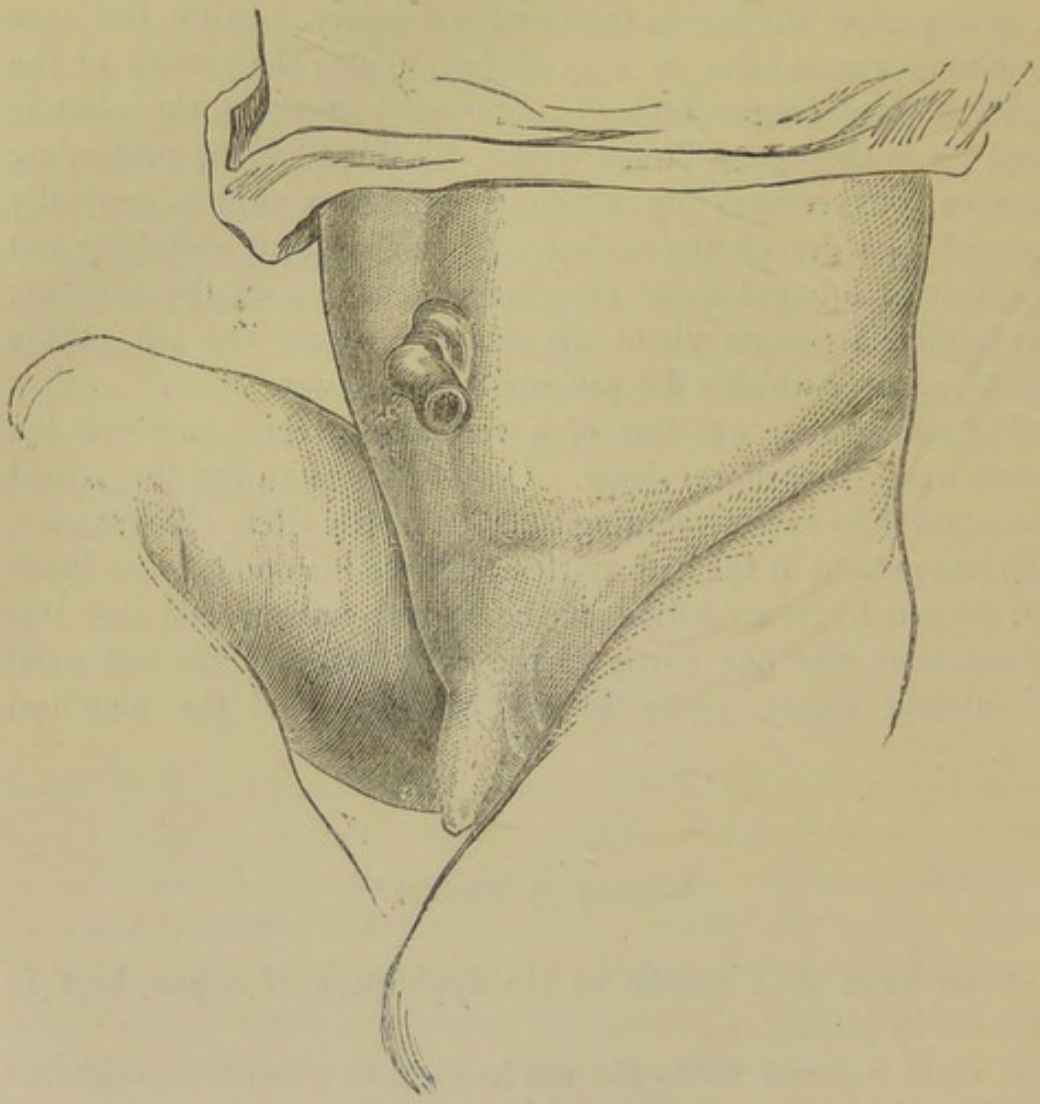
The second case was that of a very weakly child, in whom the hernia was of a pyriform shape. On the thirteenth day the patient was attacked by severe vomiting and died shortly after. Rokitansky, who was present at the post mortem, gave as his opinion that death was caused by incarceration of the hernial tumour, and that this incarceration was due partly to the contraction of the cicatricial granulating tissue, partly to the contraction of the umbilical ring.

Umbilical hernia.

These cases were treated by the application of a pad, kept in position by plaster.

A child fourteen weeks old was brought to us with a congenital fæcal fistula, connected with the intestine at the umbilicus. At this point an invaginated loop of intestine, half an inch in length protruded. Fæces rarely or never passed through the fistula, and the bowels acted naturally every day. The child was very much emaciated. I fancy that this was a case where an intestinal diverticulum remained open at the umbilicus. I ligatured the protruding portion and removed it; no peritonitis followed. The bowels continued quite regular. My idea was, as soon as the ligature came away, to attempt the closure of the fistula, but as the child was very weakly, the parents took it away from the hospital, and it died soon after; unfortunately no post mortem could be obtained. (See next page, Fig. 16).

FIG. 16.—CONGENITAL FÆCAL FISTULA CONNECTED WITH AN INTESTINAL DIVERTICULUM.



Ventral hernia.

In the case of a child, æt. 8, a ventral hernia formed, just above Poupart's ligament, pushing through the cicatrix of a previously existing deep ulceration of spontaneous origin.

Phrenic hernia.

A diaphragmatic hernia was met with accidentally in making a post mortem on a man, æt. 55. Through a round, smooth-edged aperture, the size of the hand, on the right half of the diaphragm, part of the liver and several loops of the small intestine, projected into the right pleural cavity. There were no symptoms during life.

Ventral hernia with symptoms of strangulation and chronic peritonitis.

Friderike C—, æt. 43. Twenty years previously she gave birth to her first and only child. Shortly after the confinement she noticed a soft, reducible tumour, the size of a hen's egg, close to the umbilicus on the left side. During the succeeding twelve months the tumour became constantly larger. Ten years later, symptoms of incarceration occurred ; the abdominal hernia became irreducible, and the patient was operated on by Prof. von Bruns in Tübingen. The hernia came back after the operation, but for a long time was reducible. The patient neglected to wear her bandage, and went back to a rather laborious occupation: the tumour then became gradually larger and larger. During the last few months, before she came under our care, it had been painful and irreducible. Four days before she was taken into the hospital, she had severe abdominal pain, vomiting, and constipation. The patient was a very spare, thin woman ; when admitted the pulse was very small, and the temperature low. A ventral hernia, larger than a man's head, existed close below and a little to the left side of the umbilicus. The swelling was in part resonant on percussion. Opium was given and attempts made to replace the tumour without success ; the vomiting continued. I therefore made an incision through the abdominal walls, into the upper border of the tumour. Immediately on making this incision, an enormous amount of the fluid contents of the small intestine escaped from a long loop of gut, which was adherent to the edge of the opening. None of the fluid, however, escaped into the abdominal cavity, as the portion of intestine opened was universally adherent to the abdominal wall. It was found impossible to examine further the state of the parts, for the intestines were everywhere inseparably matted to each other or to the hernial sac. The intestinal fistula, which I had unintentionally formed, I left open. Slight improvement followed the operation for a while, but then collapse ensued, and she died five days later. Post mortem: no exact explanation of the incarceration could be made out, but all the intestines were united into a convoluted mass, adherent everywhere to the omentum and the abdominal walls.

Internal strangulation. Abdominal Section.

J. H, æt. 24, a vigorous, strong man, was seized suddenly, without any known cause, with severe abdominal pain, followed shortly by vomiting. These symptoms kept on increasing, and no action of the bowels took place. Six days after the commencement of the illness, the patient was brought up to the hospital with all the symptoms of ileus. He stated that as a child he had an inguinal hernia on the right side, but that of late years he had never noticed it. No trace of hernia could be found in the right inguinal region. Inasmuch as opium, clysters, poultices to the abdomen, etc., had already been employed and the patient's condition was evidently beyond cure

by internal medicine, I proposed an operation, to which the patient gladly assented. As there was a chance that the formerly existing hernia might be strangulated in the right inguinal canal, an incision was made through the skin in this region. On dissecting down, a hernia sac indeed was found, but it was empty. The abdominal wall was next slit up as far as the internal opening, but no strangulation was there found. I introduced my finger deeply, but could feel nothing abnormal. I then carried up the incision through the abdominal wall, first two, then four inches above the internal ring, and, exposed some very red and distended intestine. The gut was pressed to one side, and after some search, it was found that a tolerably long loop of intestine had slipped through a hole in the mesentery, and had thereby become strangulated. In attempting carefully to draw back the loop of intestine, I tore it at the strangulated spot. The fæces escaped through an opening about the size of a shilling, but we managed to prevent all but a very small portion from escaping into the abdomen. I then enlarged the opening into the mesentery, and carefully drew back the entire loop. Except at the ruptured spot, this coil of intestine was not materially injured. The abdominal cavity was washed out, and the portion of intestine in which the opening lay was united to the abdominal wall in such a way as to allow the contents to escape externally. Although the patient was reduced to an extremely weak state, the vomiting ceased, and the distension subsided entirely. The fæces passed out through the fistula. Unfortunately, two or three days after the operation, phlegmonous inflammation commenced about the wound, the result, as was afterwards discovered, of the sloughing of the abdominal fascia. Partial gangrene followed with collapse, and he died nine days after the operation. Post mortem: extensive fibrous adhesions were found, chiefly in the right side, which connected the folds of intestine together. The open part of the intestine was united to the abdominal wall.

Although this case ended fatally, yet it has more encouraged than deterred me from similar operations. I think now that I committed a great error at the outset, in making my incision for the laparotomy in the side, and still more, of continuing it in that region. Such an incision would have been quite proper, on the supposition that the strangulation was situated at the internal abdominal ring. But as soon as this idea was shown to be incorrect, it would have been better to have made a new incision in the linea alba. The lateral wound throughout the muscular abdominal wall, the consequent hæmorrhage, and especially the difficulty of uniting the incision by sutures, together with the pressure which had necessarily to be exerted on the wound, were all conditions very unfavourable to rapid healing. Cases occur from time to time where all the symptoms point to severe ileus, and yet spontaneous recovery takes place. In such the diagnosis may be very difficult. Bearing in

mind the striking results of ovariotomy, I think we ought undoubtedly to decide on laparotomy more frequently in these cases. Enterotomy above the strangulated point is a very unsatisfactory operation, and has not fulfilled the expectations that were entertained of it.

Cases in which symptoms of strangulation were present though no strangulation existed.

S. W—, æt. 43, had noticed a small tumour in the right groin for about twenty years. Fifteen years previously the tumour became very painful on one occasion and she had severe abdominal pain and vomiting. The tumour was reduced by a medical man and the pain and vomiting ceased; however, she did not take to wearing a truss. The day before her admission into the hospital she was seized with violent pain in the tumour, vomiting and constipation. Unsuccessful attempts were made before and on her admission to reduce the tumour by taxis. The swelling was about the size of a walnut, very hard and painful, and situated in the right femoral region. Herniotomy was performed; the hernial sac was so fibrous and thickened that at first I thought it was the uterus. At length I succeeded in opening up a small cavity lined by a smooth, serous membrane, containing nothing. It proved to be an empty hernial sac, the walls of which were fully half an inch in thickness. A ligature was placed around the sac, and it was removed. The symptoms of incarceration disappeared and the patient recovered.

Another case of the same sort is the following:

A. H—, æt. 24, had suffered from lancinating pain on the left side of the abdomen ever since her first pregnancy, which happened when she was twenty years of age. Six days before her admission to the hospital, she was seized with severe pain in the abdomen, which, however, diminished during the next two days, so that she was able, though with some effort, to continue her work. Three days after the commencement of the symptoms, she was forced to take to her bed. She had a constant inclination to vomit. Two days before admission, the bowels acted after an enema. On her admission we diagnosed a small, strangulated femoral hernia on the left side, with much flatulent distension. Taxis was attempted unsuccessfully. Herniotomy was performed, but we found that the tumour consisted only of a thickened and inflamed empty hernial sac with a very narrow cavity. Recovery followed its ligature and removal.

The third case, almost exactly similar, occurring in the person of a woman æt. 68, illustrates well the fact that inflammation of an old

hernial sac may present symptoms indistinguishable from those of strangulated intestine.[1]

J. M—, æt. 50, had had a small femoral hernia on the left side as long as she could remember; the rupture had always been easily reducible, and she had never worn a truss. Four days before her admission the hernial tumour became painful, and she had symptoms of incarceration of moderate severity. Herniotomy was performed, and the hernial sac, on being laid open, was found to contain nothing but a tablespoonful of thin pus (hernia purulenta).

Caspar G—, æt. 32, had suffered for a long time from a reducible inguinal hernia of the left side. For many years he had suffered from constitutional syphilis, and two years previously had some ulceration of the rectum, which led to the formation of fistula. Fifteen days before his admission he was attacked with violent pain in the abdomen, which rapidly ran on to peritonitis and was attended by severe vomiting. The hernia was perfectly movable; the lower part of the abdomen was especially painful, and it was from this part that the pain originated. As the vomiting and all the other symptoms increased, I thought that I had better attempt to discover, as there seemed but little hope otherwise, whether there might be some strangulation in the intestine at the internal abdominal ring, or in its neighbourhood. I therefore performed herniotomy, and gradually extended the incision upwards through the abdominal wall, but could feel nothing on exploration with my finger. A large quantity of peritoneal effusion escaped. Death occurred the day after the operation, the fourth after the commencement of the peritonitis. Post mortem: an ulcer the size of a thaler was found on the ileo-colic valve, close to which was a perforation; it was at this point that the peritonitis had originated. Professor Griesinger pronounced the lesion to be a slowly progressing typhus ulcer. Subsequent inquiries proved that a few weeks before his admission he had suffered for some time from weakness and diarrhœa, accompanied by slight malaise.

Probably this was a case of typhus ambulans levissimus. It is conceivable, however, that it may have been a very rare instance of a syphilitic ulcer in the cæcum. Some nodules of fatty, degenerated, and dry broken-down tissue were found in the spleen, which may possibly also have been of the nature of syphilomata.

Jacob W—, æt. 30, had suffered for fifteen years from an inguinal hernia, on account of which he had always worn a truss. About five months before admission he had broken his truss, and since that time it had kept the hernia

[1] It seems as if all the symptoms of strangulation as we commonly know them, may occur when any of the abdominal contents pass into the hernial sac, *i.e.* all these symptoms, vomiting, constipation, abdominal pain, etc., arise when the lesion affects any part supplied by the abdominal sympathetic nerves. [Ed.]

up but imperfectly. He had noticed also for half a year that the right testis, which was always rather higher than the left, had gradually increased in size, though without giving any pain. However, he had never submitted to any treatment for this complaint. About eighteen hours before admission he was attacked with violent pain in the lower part of the abdomen; he sent for a medical man, who gave him a mixture. The griping pains diminished after this, but still persisted in the right side in the neighbourhood of the hernia. The patient lost appetite, and on the morning of admission he had severe vomiting. When admitted he had an inclination to vomit. All the symptoms seemed to point to strangulated hernia, although it was noticeable that the right testis could not be properly separated from the hernial tumour. Taxis was tried ineffectually. Herniotomy was performed and the hernial sac was found to contain only the strangulated testis, degenerated to a soft pulp. This was removed and recovery followed.

Umbilical hernia.

A stout, strong woman, æt. 54, was admitted with a moderate-sized hernia, which had been strangulated for twenty-six hours. She had no particular pain, and the case was not at first regarded as serious. Taxis was tried ineffectually after she had been in a bath for an hour, and then, under an anæsthetic, herniotomy was performed. The hernia consisted of a loop of intestine completely gangrenous, and a portion of the omentum of a reddish grey colour. I did not replace the omentum, but merely laid open the intestine. For the first two days all went on well, but then vomiting and distension began; very little escaped from the artificial opening in the intestine, and nothing at all passed by the rectum. Death followed four days after the operation. At the post-mortem examination, the coils of intestine lying in the umbilical region were found extensively matted together, as well as to the omentum and the abdominal wall. The strangulated portion of intestine was so much bent upon itself that the escape of fæces at the artificial opening was materially interfered with, even after the operation.

Strangulated Hernia. (Z. B.)

The number of herniotomies has diminished from year to year, since the more extended employment of chloroform has allowed increased facilities for taxis.

In sixteen cases of herniotomy[1] for strangulated inguinal hernia, attempts were made to replace the gut in every instance without opening the sac; in one instance only, that of a woman, did the endeavour succeed. In one case it was found impossible to reduce

[1] At Zürich.

the intestine after division of the abdominal ring and the neck of the sac; the intestine was then punctured, but still reduction could not be effected. On extending the incision upwards, the loop of intestine (cæcum) was found twisted on its axis; death followed. One well marked case of a so-called Littre's hernia was met with, and in one instance the hernia consisted of the bladder. We know only too well that, as a rule, people with strangulated hernia come too late to the hospital, even when they have had proper advice from their medical attendants. The usual practice at Zürich, in cases of strangulated hernia, is to place the patients at once in a warm bath, and keep them there for an hour; then they were placed under chloroform, and if taxis was unsuccessful, herniotomy was at once performed.

In three cases only, out of seventeen operations for strangulated femoral hernia, was it found possible to reduce the hernia without opening the sac. Among the cases of recovery, an interesting instance is noted, where the Fallopian tube was found in the hernial sac on the right side.

Fæcal fistula after operation for strangulated hernia.

In the case of a man, æt. 40, a fæcal fistula formed, after operation for strangulated femoral hernia; the gut was found to be gangrenous, and a portion of the intestinal wall afterwards sloughed. In the course of the next three months the fistula diminished in size, but would not close. The fæces all passed through the fistula. Attempts to completely close the opening with a pad could not be borne for any length of time, and the bandage became detached by the forcible discharge at the end of twenty-four hours. On examination, a valvular formation was found on the posterior wall of the intestine, and above this, marked stenosis where the gut had been partly destroyed. My assistant, Dr. Ris, devised a most ingenious apparatus, whereby the protruding fold was so pushed back that the fæces, in part, were able to pass through the rectum. Further than this I could not get by the employment of this apparatus. I dilated the fistula with laminaria and divided Poupart's ligament in order to be able to ascertain the condition of the parts as clearly as possible, but I could not succeed sufficiently to be able to apply the entérotome with proper certainty. I had a suspicion that the fistula was connected with the sigmoid flexure, since the fæces were not of the consistence which might be expected if they came from the small intestine. In order to ascertain the time that it would take for some injected milk to pass, we threw in some with a catheter into what we supposed was the lower portion of the intestine. An hour afterwards the whole of the milk was passed by the urethra. Now, on examining the bladder, we found that there was a vesical,

as well as an intestinal fistula, although during a period of three months not a drop of urine had passed through the fistula. This, therefore, had been a case where the hernia was vesical as well as intestinal, and where a portion of the bladder and intestine had become gangrenous from the strangulation. The patient became gradually weaker and died five months after the operation. Post mortem: a well-marked stricture was found in the small intestine, at the point where the fistula existed. The process of the bladder protruding from the side, like a diverticulum, opened close to the intestinal fistula. This process was closed by a valvular fold of mucous membrane.

Fæcal fistula.

Martin W—, æt. 65. Two years before he came under my care, the patient had allowed a 'rupture cutter' (Bruchschneider), whose name he would not reveal, and who was not a qualified man, to perform a radical operation for a large scrotal hernia of the left side. According to the patient's account, the entire hernial sac, together with the scrotum and testis (the left testis was absent), was encircled by a ligature, cauterised, and allowed to slough off. The patient survived this proceeding, but afterwards a tumour bulged forward in the wound; this the operator pronounced to be an abscess, and opened it; however, no pus came, but gas and thin fæcal fluid escaped. The wound healed, but the fistula persisted, though there was but slight discharge from it. When he came under me two years later I found an enormous hernia on the left side, partly inguinal and partly ventral. The bowels acted regularly, and very little discharge took place from the fistula. A suitable bandage was applied, and the fistula healed up in five weeks.

Carl W—, æt. 28, stated that fourteen years before admission a swelling formed in the right iliac region; it broke spontaneously, and pus and fæces escaped. The opening thus left contracted at times, and then again enlarged. For two years it had closed up altogether but broke open again ten years before his admission, as he was lifting a heavy weight. Suppuration about the abdominal walls followed, leaving numerous sinuses; these latter had been laid open, but no operation had been undertaken, or attempt made to cure the fæcal fistula. For five years the patient had worn a linen plug and a firm compress on the opening, which had closed it very effectually. I found an opening in the abdominal walls close to the cæcum, about an inch and a half in length and three quarters of an inch in breath. This I closed by turning down a flap from above, applying the epidermal surface to the mucous membrane of the intestine. The central portion of the flap healed, so that the fistula was bridged over. Unluckily the patient would not submit to any further operative proceeding, and left incompletely cured. I have no doubt that I should have succeeded ultimately in closing the fistula.

Katherine W—, æt. 39. In this case an unbilical hernia had formed at the patient's first confinement, sixteen years previously; during subsequent pregnancies it increased in size, and became irreducible. During her eleventh

pregnancy, the hernia became incarcerated, and she had symptoms of ileus and severe peritonitis. Gangrene of the gut followed, leading to the formation of a fæcal abscess at the umbilicus, through which subsequently all the fæces passed. In spite of this terrible mishap, she was delivered at the proper time of a healthy child. The fæcal fistula remained, however, after the confinement, in the same condition as before. Dr. Menzel succeeded, after repeated careful examinations, in discovering the upper and lower openings in the intestine and determining the position of the intermediate portion with such accuracy that we were able to apply the entérotome. After four hours, however, the instrument had to be removed, owing to the severity of the pain. A week later the entérotome was again applied; it came away in twenty-four hours and a few shreds of tissue were found between the blades; five days later it was again applied; in the evening severe abdominal pain occurred, which, however, was completely relieved by morphia injections. During the next three days, the instrument was applied more firmly, again giving much pain, which did not last long. Five days after the last application the entérotome came away, enclosing a portion of mucous membrane. The fistula was then carefully closed by a pad and compress, and three days later the first natural motion passed which she had had for eleven years. When she was discharged a few days later, the fistula was very small and nothing escaped from it. A few months later it had completely closed.

One remarkable case, where the processus vermiformis degenerated into a cyst, was strangulated, is described by Dr. Wölfler in the 'Arch. f. kl. Chir.,' Bd. xxi, p. 432.[1]

Femoral Hernia.

In two cases, where simple taxis was successful in reducing the hernia, a fatal result ensued. In one of the patients, rapid collapse and cyanosis came on four hours after the taxis. Post mortem: it was found that the intestine had been torn at the strangulated part. The hernia had been strangulated for five days; the symptoms were not particularly severe, there was no peritonitis and the hernia gave scarcely any pain. Very moderate taxis was sufficient, without the use of any anæsthetic. Death was due to fæcal extravasation into the abdominal cavity. In the other case, the patient was admitted with severe peritonitis. The hernia was very easily replaced, but the vomiting persisted, and the patient died of collapse fourteen hours after the taxis. Post mortem: the case was

[1] Mr. Pick has recorded a similar case which occurred in his practice at St. George's Hospital, in the 'Lancet,' No. xxi, vol. i, 1880, p. 801. [Ed.]

found to be one of Littre's hernia, with the gut in a gangrenous state.

Strangulated Hernia. (W. B.)

Between 1860 and 1876, 164 cases of strangulated hernia came under observation (89 males, 75 females). In 89 instances the hernia was reduced by taxis, without operation. Two patients died after taxis. In 73 cases herniotomy was performed, with 35 recoveries and 38 deaths. The number of cases successfully treated by taxis ought to be rather larger than the above figures show; a number of persons who came up to the clinic immediately on noticing symptoms of strangulation were not kept in the hospital, but were furnished with trusses and sent back home again after the reduction of the hernia. In the majority of these patients ineffective attempts at taxis had been made before they came to us. Often enough the symptoms had existed for several days. This explains the unfavourable result in some cases: thus in five of the patients operated on, the hernia was found completely gangrenous, and in two cases, where taxis was employed, gangrene had set in.

Formerly I always followed the advice given to me by my teachers, and in performing herniotomy avoided, if possible, opening the sac. I have often succeeded in so doing, but I never found that it had any material influence on the subsequent result. As regards injuries to the peritoneum, our ideas have become materially modified; we no longer apprehend any direct danger to life from injury or wound, but rather from septic infection of the peritoneum, a membrane from which the poisonous material is readily absorbed into the blood. Now I have repeatedly satisfied myself that the serosanguineous faintly-smelling fluid, such as is commonly found in the sac in herniotomies, frequently contains bacteria. I have been able to convince myself of the septic properties of this secretion, by the infection of a small wound on my own finger, and by the inoculation of a rabbit's cornea. Every surgeon will admit the extreme difficulty of judging accurately of the condition of a hernial loop of intestine, or a protruding portion of omentum, by the colour. We know now that during the intermediate stages of an inflammation of a tissue, going on to gangrene, septic products are formed; these products have infective properties. We can scarcely wonder, therefore, if, after replacing a semi-gangrenous coil of intestine, the peri-

toneum becomes infected and septic peritonitis is set up, which, previously, in all probability could not have taken place. Much of course depends on the firmness and extent of the fibrinous adhesions shutting off the herniated part from the rest of the intestine. On this account I consider it, therefore, far better to open the sac on all occasions, to let out the fluid, and then to disinfect the protruding strangulated intestine by careful washing with carbolic acid. This should be done before the constriction is divided. The intestine should then be allowed to slip in, care being taken to avoid, as far as possible, cramming it back, or pushing it too far into the abdominal cavity with the fingers.

Section C.—Diseases of the Rectum.

Case of perforating ulcer of rectum. Atresia ani. Case of fistula in ano. Operations for fistula in ano. Case of prolapsus recti. Treatment of hæmorrhoids. Removal of rectum for cancer. Case of malignant stricture of rectum. Case of permanent recovery after removal of rectum. Cancer of rectum—Treatment.

Perforating ulcer (?) of the rectum; death from septicæmia.

François J—, æt. 43. As far as could be made out from this man's account, he had suffered for ten days from pain in the perinæum. He had never had any difficulty in micturition, but had been troubled at times with hæmorrhoids. Though a strongly built man, he was in a weak, apathetic state when admitted, with sunken features, rapid, small pulse, and low temperature. The parts in the neighbourhood of the rectum and perinæum, and the posterior part of the scrotum were gangrenous. The urethra and the bladder were normal, and nothing wrong could be felt in the rectum, though this examination gave him a good deal of pain. Incisions were made into the gangrenous part, and diffused purulent infiltration of the cellular tissue found everywhere. He died on the fourteenth day of septicæmia. The post-mortem report was as follows:—"On the right side, in the neighbourhood of the rectum, an irregular suppurating area, the size of the fist, extending back to the base of the bladder. The skin of the penis highly œdematous, and infiltrated with pus; the urethra perfectly normal. Two centimètres in front of the gangrenous portion of the urethra an abscess in the corpus cavernosum, about the size of a walnut, containing dark foul pus. Urinary bladder normal. In the rectum some hæmorrhoidal tumours of moderate size;

at one point a round opening, two millimètres in diameter, ending in a stellate-shaped cicatrix, leading to the above-mentioned suppurating area. A little above this, another opening, leading to the same point."

Atresia ani.

A child three days old was admitted with enormous distension and icterus. The lower end of the rectum could not be found; an artificial anus was made in the sigmoid flexure. The child died nine days after the operation.

Fistula in ano, treated by galvano-cautery.

This was the case of a very wretched, anæmic woman, about thirty years of age, who had suffered from hæmoptysis, and had at the time of operation, a considerable amount of bronchial catarrh. She had also had repeated attacks of peritonitis. I had twice declined to operate, on account of her weakly condition. She had three moderately long fistulæ, which occasioned her such intensely severe pain (a symptom which hitherto I had very rarely seen) that she was constantly seeking advice. The pain was only partially relieved by morphia suppositories, and the administration of this drug caused headache and vomiting. At last I decided to divide the fistula carefully with the galvano-cautery. I succeeded in doing this without the loss of a single drop of blood. It was some time, however, before the wound healed and the patient then returned home free from pain.

The frequency of affections of the rectum, especially of fistula in ano, in Vienna, was to me a matter of some surprise. I was struck, also, with the number of cases in which this disease was combined with tuberculosis of the lungs. I had not met with this previously either in Berlin or at Zürich, and it was only in Vienna that I was first able to appreciate the advice of the older surgeons to abstain from operating on fistulæ in tubercular cases. Judging from the small, short fistulæ, which I had previously met with once in a way, such counsel had seemed to me excessive pedantry. The geographical distribution of surgical diseases is far more irregular than any one who had always practised in one locality would suppose.

Fistula Recti et Ani.

Of fifty-eight cases met with at Vienna, nine were operated on with the galvano-caustic wire loop. In two the fistulæ were complicated by moderately tight stricture. These were divided, and

dilated by bougies. One woman died of erysipelas after this operation.

All my cases of fissure (seven) recovered after cauterisation with nitrate of silver and application of zinc ointment, except one, where the condition returned as before.

Prolapsus recti.

A woman, æt. 33, had a prolapse of the rectum, which descended sometimes when the bowels acted, to the extent of three inches; she had some difficulty in reducing it. I applied fuming nitric acid to the prolapse over four strips of the mucous membrane, in a longitudinal direction, each a finger's breadth. The patient was discharged in three weeks; the prolapse then no longer descended when the bowels acted. Fifteen months later the patient wrote that the prolapse had unfortunately returned to some extent, though it was not so bad as before. On the whole she felt much better.

From this it may be seen that in such cases the effect of the fuming acid is not sufficient. In two cases treated by the actual cautery, I learned four years after the operation that the cure had been effectual.

Hæmorrhoids. (W. B.)

The frequency of this affection is very unequally distributed throughout the world. It is very common among the Slav population, especially the Gallician Jews; even youths often suffer, and are so reduced by the loss of blood that at times operation is imperatively necessary to save life. In ten cases which came under my treatment in 1869-70, I adopted the method of cauterisation with the wire loop, which has been so successfully employed by von Langenbeck. One of these patients I saw after the lapse of a year, and was able to satisfy myself of the permanency of the cure. It can be easily understood than when a tendency to obstruction is associated with these hæmorrhoidal protrusions (which is more rarely the case than one might think) it cannot be removed by the operation. I usually removed the hæmorrhoids by means of the galvano-cautery. The patients were narcotised and placed in the same position as for the other methods of operating. The tumour was then drawn forward by forceps, and cut through as slowly as possible with the galvano-caustic loop, which ought scarcely to be

raised to a red heat; it will be found better to abstain from touching the cauterised surface with sponges. In this way the entire operation may be performed without any loss of blood. I am careful not to remove the entire tumour, in order to prevent the formation of a cicatricial stricture. If three or four tumours require removal, care should be taken to leave strips of mucous membrane between each of them. Some narrowing of the tube is apt to follow, five or six weeks after the operation, causing the patient some trouble in defæcation. In a month or six weeks, however, the cicatrix yields again, and the annoyance disappears. In order to save the patient this discomfort I have been in the habit lately of removing not more than two of the larger tumours, above and below or on either side. The bowels should be properly cleared out for several days beforehand by castor oil and injections. On the day of operation I give some opium, in order to prevent any action of the bowels following shortly after operation. On the third day I give a dose of castor oil. Care should be taken not to cauterise the anal folds, as this causes unnecessary discomfort to the patient. The pain, which is usually tolerably severe during the first few days, can be controlled by cold. Cloths wrung out of iced water should be laid between the nates, and frequently changed. No local after treatment is necessary. I find that by this plan of treatment all danger can be avoided, and a cure most quickly effected.

Hæmorrhoidal Prolapse.

In one case of this nature spontaneous recovery took place. The patient was admitted with the prolapse strangulated and gangrenous. In due course it dropped off, and recovery took place without any general constitutional disturbance.

In a few cases a cure was effected by taking away two or three small folds by means of the galvano-caustic loop; in nine cases the application of fuming sulphuric acid was very successful. On the value of this latter method I have already made some remarks in the 'Wien. Med. Wochens.,' 1871, No. 35.

All the patients (eighty-one) who came under my treatment for this affection were cured. In a few instances I know that the condition returned in a slight degree, but in most of the cases the

recovery was permanent. I have already in the 'Wien. Med. Wochens.,' 1871, No. 35, pointed out the great advantage of employing fuming sulphuric acid. I have not been able to discover that the acid nitrate of mercury has any special qualities to recommend it. Both caustics are disadvantageous in one respect, viz. that their action is materially interfered with when hæmorrhage takes place from the application; these are the very cases where the hæmorrhoidal condition is apt to return owing to imperfect cauterisation.

In such cases the actual cautery takes its old place, as it does also wherever the protrusion is very large, or requires to be drawn forwards with the vulsellum, a proceeding which always occasions some bleeding.

In singly occurring protrusions personal convenience will guide the operator in choosing between the actual cautery and the galvano-caustic loop. Quite recently I have, for convenience sake, employed von Langenbeck's clamp, and then destroyed the hæmorrhoids by Paquelin's cautery. This method of operating is the most convenient for the surgeon, and the most radical for the patient when an anæsthetic is desired. I have only employed the ligature and écraseur once, in order to show it to my audience, as I had no previous experience of its efficacy.

Cancer of the Rectum.

While at Zürich I extirpated the rectum in twelve cases, on account of malignant disease. Except in two, they were all cases of ulcerated alveolar cancer (Drüsen Krebs); six recovered and six died of peritonitis after the operation.

Cancerous stricture of the rectum. Removal.

Herr S—, about fifty years of age, had suffered for many years from obstruction, which, however, he had always been able to overcome successfully without taking any medicine, by carefully regulating his diet. Three months before he consulted me, very severe pain attacked him, and he lost some blood whenever the bowels acted. The motions were very hard and painful. Examination occasioned much distress, but I was able to find, about half an inch above the rectum, a stricture, caused by a projecting cancerous growth. The stricture was about an inch and a half in length, and the finger could

just be passed through it; the hard masses of new growth were tolerably movable. In October, 1870, I removed the lower end of the rectum. As the patient was rather anæmic, the operation was performed as far as possible with the galvanic loop. After the diseased portion had been extirpated, I felt high up, on the left side of the wound, a rather hard nodule, the size of a hen's egg, which I removed partly with the finger, partly with the scissors. Furious hæmorrhage followed, and we had the greatest trouble in controlling the bleeding by protracted digital compression and ice. During the next twenty-four hours, the patient's life hung in the balance, and it was only by long-continued stimulation and artificial heat that we were able to keep him alive. Convalescence was slow, but still the wound eventually healed. The patient was again able to retain the fæces, and for some months was restored to very good health. About five months later, the sacrum became tender on pressure and he was frequently attacked with severe pain in this region. The left inguinal glands began to enlarge, and the patient lost strength. No recurrence took place locally. When I saw him eight months after the operation the anal opening was very wide. The mucous membrane of the rectum, which was normal in appearance, projected downwards, like a small ectropion; the patient could retain the faces, when they were not of too thin consistence.

Although such cases are more deterrent than encouraging, when we look to the danger of the operation and the rapidity of recurrence, yet I have met with one which dissuades me from giving up extirpation of the rectum for carcinoma.

I was consulted by a lady, æt. 58, for a prolapse of the rectum, of moderate size. I learned from her medical man, who was present at the operation, that, three or four years previously, Schuh had removed with the galvano-caustic loop, a ring-shaped cancer of the rectum, which extended high up the bowel. She had been operated upon also with the knife, by Dr. Low, two years before she consulted Schuh.

When I saw her no trace of recurrence had taken place. Except for the local trouble resulting from the removal of the rectum, the lady was perfectly well. As there was no possibility in this instance of any error of diagnosis, the case may be noted as one of permanent cure.

While at Vienna I removed the lower end of the rectum in thirty-three cases; once for melano-sarcoma, in all the other instances for carcinoma. Twenty of the patients survived the operation, though most of these died within two years of recurrence: thirteen died of the operation. The severe hæmorrhage attending this operation did

not seem to be diminished by employing the galvano-caustic apparatus; none of the patients died actually from this cause, though great loss of blood more than once gave cause for anxiety. Death invariably took place from retro-peritoneal suppuration which as a rule was characterised by acutely septic symptoms, so that the patients generally died in from four to eight days; two cases only lasted rather longer. At times it seemed as if the suppuration were inclined to decrease, after the separation of large sloughs of cellular tissue, but the patients died nevertheless of pyæmia and exhaustion. On the whole I have come to the conclusion that cases where the whole of the sphincter, together with a portion of the skin was removed, do better than those in which as much as possible of these parts is preserved. By trying to save too much the discharge of secretion is impeded, even when almost the entire cavity of the wound is filled with drainage tubes. Uniting the edge of the rectum to the skin wound hinders the escape of secretion, even though only two or three sutures be employed; I do not now advise this plan, by which at the best but little is gained. Healing by first intention can rarely be looked for; as a rule, the sutures cut their way through within two or three days, and the rectum then becomes drawn up again. One case which was remarkably successful, in respect of the length of time that elapsed without any recurrence of the disease, has already been mentioned (p. 255). The majority of these cases are unsatisfactory. The number of patients that I have seen in private, on whom I declined to operate, is tolerably large; the despair of these unfortunates, like that of many others who have been sent up for operation, is often heart-rending when they hear that no operation is advisable, and that they must abandon themselves to the prospect of a speedy end to their lives. So it has come about that in spite of the unfavourable prospects I have from time to time taken up this operation again, yet I can well understand that these operations are wholly discountenanced by surgeons who seldom meet with such cases, and who are spared the distressing scenes which are inflicted on us, owing to the vivacious and sensitive nature of the Austrian temperament.

CHAPTER XII.

DISEASES OF THE URINARY ORGANS.

Case of abscess perforating the bladder. Cases of renal tumour; Hydronephrosis. Case of foreign body in bladder. Remarks on chronic cystitis and pyelitis. Alkaline fermentation of urine —Treatment. Case of laceration of urethra—urethrotomy. Remarks on traumatic stricture of urethra. Herpes after catheterisation. Treatment of stricture—Rapid dilatation— External urethrotomy—Internal ditto. Cases of lithotrity. Remarks on operations for stone. Lithotrity. Lithotomy. Possibility of dissolving calculus. Litholapaxy. Hypertrophy of prostate. Case of prostatic abscess. Vesico-vaginal fistula. Extroversion of bladder and epispadias—Operative treatment.

Abscess perforating the bladder.

J. M—, æt. 54. A fortnight previously he was in perfectly good health; he was then attacked with obstinate constipation, frequent desire to pass water, and pain in micturition. He was treated before he came to us, by laxatives, and catheterisation. When admitted, the catheter passed easily, but deviated to the left as it entered the bladder. Deep down in the pelvis could be felt a soft, elastic tumour, the size of a fœtal head, which was also perceptible from the rectum. I supposed that it was a retroperitoneal malignant growth of the pelvis. I ordered the water, which was turbid, alkaline, and contained pus, to be drawn off regularly, and the bladder to be washed out. The man died a week after admission. Post mortem: A retro-peritoneal abscess was found, which had perforated the bladder in two places.

Abscesses in this situation are very rare in men, though they are not of infrequent occurrence in the female sex. If a correct diagnosis had been made, puncture by the rectum might have saved the patient's life.

Renal tumour.

Barbara F—, a delicate, anæmic woman, æt. 40, was sent up to the hospital for a supposed ovarian tumour. The abdomen was enlarged as in the last month of pregnancy. The tumour was hard, had been noticed for six years, and proved to be connected with the right kidney. On puncturing it, a little yellowish, flocculent matter was withdrawn, which proved to be broken down tissue. No operation was practicable.

Hydronephrosis.

Therese B—, æt. 24. When eight years old, she suffered from abdominal pain, and for a long time was unable to get about. Swelling of the abdomen, especially of the left side followed. Twelve years before admission the abdomen was as large as when I first saw her. The swelling was then punctured, and twenty-four pints of serous fluid drawn off. Five years later the fluid had re-collected and the same quantity was again let out, it being now of a brownish-red colour. Two years before admission, the tumour was again tapped, a clear yellow fluid escaping. Since this last occasion the abdomen had slowly increased in size, without giving any pain, When I saw her, she was a well-formed, stout, girl; the abdomen was distended unequally, the upper half on the left, and the lower half on the right side, being especially prominent. Fluctuation was everywhere distinct. The tumour was dull on percussion, but not apparently solid anywhere. I tapped the swelling, and drew off thirteen pints of faintly acid, turbid, albuminous fluid, containing a few lymph cells.

Taking all things into consideration, I have no doubt that this was a case of left hydronephrosis. I hoped that analysis of the fluid would have established the diagnosis, but such was not the case. No uric or hippuric acid could be found; a considerable amount of succinic acid was detected. This last ingredient would have pointed rather to hydatid cyst, had there not been many things against such a view.

Foreign body in the bladder.

A man, æt. 34, who suffered from stricture, while passing for himself an old, much-used bougie, allowed it accidentally to slip into the bladder. A few days later he came under treatment. A catheter was passed, but nothing abnormal could be felt. Six days after the accident, the patient was unable to pass any water. On attempting to introduce an instrument, an obstacle was met with, about half an inch from the meatus. With a pair of forceps, the bougie, perfectly soft, and with the varnish worn off, was drawn out. By

the contractions of the bladder, therefore, the instrument must have been so placed that it was extruded through the urethra—an exceptional piece of good fortune for the patient.

Chronic Cystitis and Pyelitis.

I have only met with diphtheritic inflammation of the bladder as a secondary affection, and as such consequent on fracture of the spine, ruptured urethra, stricture, or hypertrophy of the prostate. The so-called irritable bladder is, by many authors, thought to be of a neuralgic nature. It is possible that there is such an affection as pure neuralgia of the bladder, but the cases which I have seen, and which correspond accurately to the "irritable bladder" of English authors, were not neuralgic at all; they were due to catarrhal inflammation of the bladder or the pelvis of the kidney, and were characterised usually by strongly acid, highly coloured urine containing a little cloudy mucus, and marked reflex contraction of the bladder, even when the organ was only moderately full. Spasmodic contraction of the sphincter vesicæ was also usually present. In patients thus affected it is often a matter of great difficulty to pass a catheter, for the urethra, near the neck of the bladder, is so sensitive that the contact of the instrument sets up a powerful reflex contraction; steady and moderate pressure with a large sized instrument will alone enable the surgeon to enter the bladder; nor is the spasm always removed by chloroform. It often happens that the catheter will pass quite easily one day, and on another cannot be got in. I have found opium suppositories and warm baths, the best remedies against this irritable condition, which, at any rate, sometimes may thus be alleviated. It appears to me that this irritability of the bladder is analogous to the spasmodic condition met with in superficial lesions of other mucous membranes, such as blepharo-spasm in kerato-conjunctivitis, or the colicky pains associated with gastric or intestinal catarrh; again, the tenesmus in fissures or excoriations of the rectum, and the spasmodic cough in many forms of laryngeal and pulmonary catarrh are of the same nature. In all such conditions considerable hyperæmia of the mucous membrane is associated with the superficial abrasion of the epithelial surface, or perhaps with some slight excoriation. I cannot say whether a similar condition of the neck or mucous lining

of the bladder, the ureters, or the pelvis of the kidney ever occurs and gives rise to the complex symptoms of irritable bladder, for I have never had an opportunity in any of these patients, of making a post-mortem examination; I consider it, however, very probable that such is the explanation. Cases of idiopathic catarrh of the bladder (from which category I exclude gonorrhœal cystitis) are, so far as my limited experience extends, of exceeding rarity. I agree with Coulson that the symptoms which strike the eye most are rather those of catarrh of the pelvis of the kidney, with or without tubercular disease of that organ (chronic caseating nephritis). As the disease progresses, it will usually betray itself by the familiar symptoms, especially when the pyelitis is completely established, with abundant purulent sediment in acid urine.

Alkaline urine occurs only in the secondary stage of vesical catarrh, though undoubtedly, it is very soon manifest. It is most commonly due to long retention, fermentation of the urine set up by materials introduced on catheters, foreign bodies, or tumours of the bladder. Perhaps also, in simple idiopathic catarrh of the bladder with acid urine, the introduction of fermentative matter, such as infusoria or fungi, may alter the secretion of the mucous membrane and lead to purulent alkaline catarrh. This cannot be so common as some suppose, for we see that pyelitis and vesical catarrh will go on for many years unchanged, and without the urine becoming alkaline. Ordinary pus of itself does not set up alkaline fermentation of the urine in the bladder; this change is due to some special variety of pus, or perhaps to some special animal or vegetable ferment.

The treatment of catarrh of the urinary passages like the treatment of chronic catarrh generally, is highly unsatisfactory. The affection appears to me as incurable as cancer or tubercle, and is only less dangerous in that it is not so rapidly fatal. Idiopathic catarrh of the urinary mucous membranes is connected with constitutional disturbances of which we know little. I have occupied myself a good deal with this subject. The classical works of Coulson, Thompson and others, mention a great number of remedies which I have tried over and over again. Purulent catarrh of the bladder with alkaline urine, will be greatly improved by washing out the bladder daily through a double catheter. Not infrequently the alkalinity of the urine can be completely remedied. A drop or two of sulphuric acid should be added to each ounce of water

injected. In cases of idiopathic catarrh of the bladder or the pelvis of the kidney, or in irritable bladder, I have never been able yet to find a sure and speedy remedy. Most patients grow weary of treatment which lasts for months. I will not mention here all the internal remedies which I have systematically employed in turn, but I may say emphatically that when the catarrh is associated with acid urine and irritability of the neck of the bladder, injections are, at best, but of temporary benefit; usually they are perfectly useless, and sometimes they increase the irritability of the bladder.

Between 1860 and 1876, I met with fourteen cases of chronic gonorrheal cystitis. The disease often went on for months, but usually subsided by means of careful diet and rest, and the persistent administration of copaiba. No severe symptoms were met with in any of these cases.

Pure idiopathic cystitis and cysto-pyelitis, by which I mean cases in which the disease was not due to infection, stricture, syphilis, or hypertrophy of the prostate, I met with in thirty-eight instances. Thirty-three of the patients were men, and five women.

I have devoted my best attention to the treatment of this distressing affection, but it seems to me an almost hopeless one. I do not hesitate to say at once to these patients that I can give them advice by which their sufferings may be somewhat alleviated, but that I cannot cure them. My experience at Zürich led me to the same conclusion. In Vienna, where the disease was very common, I tried again all kinds of new and old remedies, but without any success, save that I was able in some instances to stall off fatal consequences; still, the results of my experience may be of use to others.

These patients usually came to the hospital on account of acute exacerbation of their symptoms caused by alkaline fermentation of the urine in the bladder. For this condition treatment could effect a good deal; in such cases I formerly used to wash out the bladder with a mixture containing one drop of strong muriatic acid to thirty grammes of water; but this very often gives much pain, and I was glad to find that there were other remedies which were equally efficacious, though slower in their action. Such are phosphoric, nitric, or benzoic acids administered internally (I have not had any

experience of salicylic acid, which has lately been recommended).[1] I give five grammes of these acids with a little fruit syrup daily, in a large quantity of water. Phosphoric and nitric acids are of less unpleasant taste than benzoic acid: the latter again is not so readily soluble in water, and more, therefore, has to be taken. On the other hand, the benzoic acid is tolerated better by the stomach, indeed, I have seen cases where the appetite improved under its administration. It is well known that benzoic acid is in part excreted in the urine as hippuric acid, and partly passes out unaltered; it does not irritate the most sensitive or the loosest mucous membrane, while the phosphoric acid turns the urine acid so quickly and strongly at times that it has to be left off; if continued the vesical pains are much increased. According to the degree of alkaline fermentation in the bladder, it took, as a rule, from four to eight days in moderately severe cases before the urine became acid. Previous to this there comes a period during which the urine, when allowed to stand, is at one time alkaline again, at another preserves its acidity. Sometimes the urine was exceedingly pale, with scarcely a trace of colouring matter in it; this may perhaps depend on the amount that the patients drink. In opposition to this view we may note that the amount of urine excreted is in many cases by no means excessive; and, again, that the paleness is far more marked than can be accounted for by the drinking of large quantities of water. One other factor should be taken into account, viz. that often in these patients there is very little secreting power left in the kidneys, and proportionately little colouring matter is formed. The absence of colour is masked by the blood and pus, as long as the mucous membrane of the urinary tract is kept in an inflamed condition by the ammoniacal urine. I have seen a few cases where the patient could not stand the acidulation of the urine even with very small doses of phosphoric acid. In a few other cases, too, it was not found possible to keep the urine acid, notwithstanding that various acids were administered for periods of several weeks. Certainly, these were complicated with rough calculi in the bladder. I suspect that the ferment was contained in the irregularities and depressions of the stone.

[1] Recently I have frequently recommended a 5 per cent. solution of chlorate of potash for the treatment of ammoniacal fermentation of the urine, with advantage. I have employed the same remedy also in cases where the urine was neutral or feebly acid, and cloudy, with bacteria.

When the ammoniacal fermentation of the urine is got rid of we are able to see the true state of things. With it will disappear the ammoniæmia (evidenced by constant pain in the head, dryness of the tongue, nausea for food, especially for meat), constant tendency to micturate, hæmaturia, diarrhœa, etc., all of which conditions I look upon as accidental complications in diseases of the urinary tract.

The patients, as regards the urine, may be separated into two classes; in one set the urine will be almost perfectly clear, and a sharply-defined, viscid, clear yellow layer of pus will separate at the bottom of the urine glass. In another set of cases the urine does not become clear, but is more or less cloudy, even after it has stood for some days. Boiling seems at first to have no influence on it, but it usually becomes clear after a time if allowed to stand in the test tube after boiling. Treated with Liquor Potassæ and boiling it clears at once. In turbid urine of this description, even when fresh, I invariably found bacteria, and can only ascribe the constant cloudiness to this cause. The sediment forms when the bacteria die, or when their vegetative power is exhausted. For many years I had two such cases under almost constant treatment, and always found bacteria and turbidity, even when the urine was strongly acid. I employ the term "bacteria" here in the true sense of the word. If these organisms are examined under a strong objective (Hartnak, No. 10) they are seen as very pale, small, short, staff-shaped bodies; they are usually at rest and seldom attached in groups of three or four. They do not set up any ammoniacal fermentation. I almost doubt whether they are particularly injurious, for patients with cysto-pyelitis, whose urine is turbid and contains bacteria, have no more and no further troubles than patients similarly affected whose urine is clear. I cannot say for certain whether these bacteria become small streptococci from some accidental ammoniacal fermentation of the urine. The streptococci are always found in ammoniacal urine, but it has not, to my mind, been proved that they bring about the fermentation. For the present we must be content with our knowledge of the fact that in constantly acid urine true bacteria may be seen together with pus corpuscles. It appears very difficult to destroy these bacteria in the urine. In none of the cases which I had under observation did they altogether disappear, though in some their numbers distinctly diminished under the administration of copaiba, benzoic

acid, silicate of soda, curds, etc. These patients are very intolerant of injections into the bladder; the urethra and bladder are highly sensitive, and, as a rule, they tire of the multiplicity of remedies, and object to any new treatment, for fear lest their condition, which, at the least, is endurable, should be rendered worse. One would suppose that if these bacteria are really formed in the urine, they would be washed away by the free use of water, and the passing of large quantities of urine. If ammoniacal urine be injected into the bladder of a dog, the alkalescence lasts but a short time; the bacteria, together with the ferment, are soon got rid of, and in a few days the urine is again normal. I suspect that perhaps the place where the bacteria are formed is situated in some angle of the pelvis of the kidney, or in some pouch of the mucous membrane of the bladder. Hitherto, I have had no opportunity of confirming this idea by post-mortem examination.

The ex-centric pains and irritability are very troublesome, and in many cases exceedingly severe. Such are the constant desire to pass urine, severe pain in the perineum after micturition, painful erections especially towards morning, and a constant, moderately severe, burning sensation in the urethra, of nervous origin. I have never yet succeeded in completely relieving these symptoms, or in guarding effectually against their return. Suppositories of morphia and belladonna, frequent warm baths, chloral, lupulin, bromide of potassium, quinine, and the like, all give but temporary relief. The patients will soon abandon these remedies after they have given them a trial. It is a matter of surprise to me that none of the patients whom I had under observation employed morphia injections on themselves; most of them had a great horror of the drug, even when they had tested its efficacy more than once. I conclude from this fact that the pain cannot be so very intense. As a rule, these patients are in a highly nervous, often very hypochondriacal, state. They are tormented by the persistence, more than the intensity of the pain. After a few years they make up their minds that they have no chance of ever recovering. Often they experience a sensation of relief amounting almost to convalescence, when after a severe exacerbation they return to what they call their "proper state of disease." At least, they have the impression for the time that they are doing better, and feel, therefore, more comfortable than if they remained always in the same condition.

Of the pareses which may succeed this malady, I have only

observed two, viz. paralysis of the detrusor urinæ muscle, and of the sphincter vesicæ. Hitherto I have not met with any cases in which diseases of the spinal cord were set up in a reflex manner, although many of these patients seem to be, or to become, tabetic. In one case which I had under constant observation a year ago, the urine could sometimes be expelled without pain, but now it has to be drawn off; yet no change can be detected in the bladder with the catheter. In others the sphincter failed in its functions only when the bladder was very distended, especially in the night, as so often happens in hypertrophy of the prostate. Under such conditions the only thing that can be done is to teach the patient how to use the catheter for himself. If the bladder is able to contract to its smallest dimensions several times daily, its innervation will recover though it will not regain its normal power.

The most difficult task that the surgeon has to accomplish, after he has combated all these accidental complications is to cure the actual disease. Here it must be admitted our art chiefly fails. I think I have tried every kind of remedy that has been recommended; all kinds of astringents, drugs highly recommended by English writers such as Buchu, Pareira Brava, etc. Liq. Fer. Sesquichlor. (as used by Thompson for "irritable bladder"), inhalations of turpentine (advised by Dittel), have been tried in turn. In private, a few patients obtained slight relief from some of these drugs, especially when they first took to a new one, but the improvement did not last. Baths and mineral waters can do little more; if the patients drink much, their troubles increase. The waters of Carlsbad, Marienbad, and Heinrichsquelle, I found useless. On the other hand the baths of Teplitz, Gastein, and Baden-Baden are often remarkably beneficial. Mountain climates are seldom borne well; these patients easily catch cold, and have an instinctive dread of low temperatures. In winter, when possible, I advise these patients to seek a southern climate, but the effect of the Riviera and similar places does not come up to expectations. The more quietly these patients live, the longer do they resist their complaint. I know of cases where decided symptoms of pyelitis have existed for ten years or more and yet the affection, as determined by the quantity of pus, has not increased. With these patients I did not find it possible to make repeated examinations of the urine, at regular intervals. I cannot say positively whether the amount of urea diminishes in proportion to the gradual disappearance of the secreting substance

of the kidneys, or whether albuminuria finally occurs; the first mentioned effect is highly probable.

Pyelitis, it seems to me, belongs to that large group of diseases which we are in the habit of ascribing to the tuberculo-scrofulous diathesis. It occupies a distinct position between amyloid degeneration on the one hand, and Bright's disease on the other. The two latter processes rarely lead to suppuration of the substance or the pelvis of the kidney. From the group of tuberculo-scrofulous diseases, purulent catarrh may be dissociated. This affection does not always lead to miliary tubercle or to caseation, although both these conditions may occur. Caseous nephritis or peri-nephritis is certainly often associated with pyelitis. The catarrh of the pelvis of the kidney may either precede or follow the affection of the parenchyma; bronchial catarrh, blenorrhœa and their results are diseases parallel, though not so very often associated with cysto-pyelitis. General marasmus may occur at a late stage of renal disease, and then some slight accidental cause will prove fatal. The more inefficiently the functions of the kidneys are performed, the more danger will there be from any febrile disturbance, for the kidneys manifestly play an important part in repairing such disturbances. Ammoniacal fermentation of the urine in the bladder, with ammoniæmia, often rapidly disappears when the kidneys are doing their work tolerably well. When the cortical substance is much atrophied, such a condition may prove fatal.

Calculous pyelitis, like the cysto-pyelitis set up by chronic retention of urine, has nothing whatever to do with a tuberculo-scrofulous diathesis. Lithiasis is more connected with arthritis, rheumatism, arterial sclerosis and cardiac disease. Large calculi in the pelvis of the kidney can of course, set up suppuration mechanically, and may cause also purulent cystitis. But the reason does not seem to me quite clear why sometimes even in cases where the stones are large and rough, these changes are altogether absent, or very slight. Further investigation is necessary to determine whether the suppuration depends more on constitutional tendencies, or on the chemical and physical qualities of the stone.

Laceration of urethra. Urethrotomy.

A man, æt. 22, who three weeks previously had sustained a comminuted fracture of the pelvis, was admitted with an abscess around the urethra, and

urinary infiltration of the perinæum. The uretha had been lacerated at the time of injury by a splinter of bone. External urethrotomy was performed, and a pointed fragment of bone found loose in the abscess cavity. Death followed four days after the operation.

Further details of the case will be found in the 'Arch. für Klin. Chir.,' Bd. i, p. 447.

Stricture of the Urethra.

As long as a single drop of urine can find its way down the urethra to the meatus, the expression "impermeable stricture" is only relative, and signifies merely that the surgeon is not able to pass an instrument. The more skill and practice the surgeon has in passing bougies, the more rarely will he meet with impassable strictures. As a result it follows that urethrotomy will be less often required, unless the sensitiveness of the stricture, or the irritability of the urethra indicate this operation.

Rigors after the passage of instruments I have often seen; I have met with them occasionally in persons with normal urethræ, who required the water to be drawn off for paralysis of the bladder resulting from fractured spine. These rigors usually occur from an hour and a half up to three hours after the passage of the instrument. In most of these cases it will be found that some, though possibly a very slight injury has been inflicted on the mucous membrane of the urethra. The evidence of such lesion may consist in a little blood on the instrument, or a few blood clots in the urine; still this is not always the case:

A man, æt. 46, had a stricture, which just admitted the finest instrument. After the first two occasions on which it was passed, rigors followed, although no drop of blood escaped. On the third occasion a metallic instrument was passed; this was followed by a severe uræmic attack which ended in a copious eruption of herpes in the lip.[1] External urethrotomy was performed, and the patient soon recovered.

Sometimes the patients allow the instruments to remain much longer in the urethra than they were ordered to. I generally leave the instruments in for five minutes. No doubt this irritability of

[1] Cf. Verneuil on "Herpes as a Complication of Cutting Wounds," 'Lancet,' 1878, vol. ii, p. 873. [Ed.]

the urethra depends largely on nervous causes. I have no doubt that the feverish attacks, which are real and immediately dependent on the instrumentation, are due to swelling and transient inflammation of the urethra.

Thirteen cases of traumatic stricture in the perineal part of the urethra came under my care at Zürich and Vienna. Seven were cured by dilatation; five died after external urethrotomy which was rendered necessary by the almost complete impermeability of the stricture, and the existence of numerous fistulous openings. In all these cases a high degree of cystitis was found, greatly dilated and tortuous ureters, pyo-nephrosis and atrophy of the substance of the kidney. All these patients were operated on at Zürich, at a period when I had not learned to recognise sufficiently the injurious influence that ammoniacal fermentation of the urine in the bladder exerts on operation cases.

Ordinary Gonorrhœal Stricture.

The majority of these patients were treated by gradual dilatation and discharged as soon as the strictures were sufficiently enlarged. The patients were always advised to continue the use of instruments.

In six cases I performed rapid dilatation of the stricture with Thompson's instrument. The cure was speedily effected in all. In none of these patients was the stricture very tight nor were there any fistulæ. The reaction after the operation was usually very trifling. I am unable to say whether the cure was permanent in any of these cases.[1] In three instances internal urethrotomy was performed with Linhart's instrument. The immediate result was good. On one patient I operated twice, the second time after an interval of a year. Evidently on the first occasion the instrument had not penetrated deeply enough. Recovery seems to have been permanent after the second operation.

There is no doubt that a large number of moderately severe strictures can be permanently cured with comparative rapidity and without any great amount of pain, by the use of bougies; patience

[1] Two are recorded in the 'Wien. Med. Woch.,' 1869, p. 790.

however, and a certain amount of skill is demanded of the patients by whom the regular use of instruments has to be carried out perseveringly for periods of years. On the other hand it is unquestionable that strictures through which at first only the finest bougies or catgut instruments can be passed, will prove very troublesome, painful, and tedious to cure by dilatation. The pain, the intercurrent swelling and the periurethritis by no means diminish in proportion to the increase of the dilatation. On the contrary, whenever a change is made to a larger instrument, much care must be exercised, lest the cure be interrupted again for a long time by the swelling of the parts. Many of these sufferers lose patience; many again die from the inflammation which the constant instrumentation sets up about the urinary passages. My statistics furnish fresh evidence of this. In seventy-five cases of urethral stricture (without reference to the cause or situation of the disease) treated by gradual dilatation, the mortality was 9·9 per cent. No doubt it should be noted, that these statistics were compiled almost exclusively from hospital cases, that is to say from the labouring classes; such patients do not usually seek for advice until their sufferings become so troublesome that they are unable any longer to follow their employment. As a rule these people came to the hospital complaining of vesical pain and catarrh; most of them were unaware that they had a stricture. But gonorrhœal stricture is very common in the higher and more educated classes, where the people take more care of themselves and are more ready to consult the surgeon for slight disturbances of health. By excepting this class of cases we should exclude a considerable number of the slighter cases of stricture, for which dilatation is the most suitable treatment. The mortality given above, therefore, can only be held true as regards hospital practice.

I am quite convinced that in moderately severe as well as bad cases of stricture, internal urethrotomy and rapid dilatation as a means of accelerating the cure, will soon be as extensively adopted in Germany as these operations are in England and France. Hitherto the fear of the treatment has been very considerable, not only amongst German surgeons, but also amongst German patients. The latter, as a rule, consider that dilatation with bougies is unattended by any serious risk, while they dread any cutting operation. Of late years, unfortunately, I have had few opportunities of practising more widely these operative measures. From what I have seen, the progress of these cases after operation is almost free from any reaction;

although my teachers had very little good to say for it, I have been most favourably impressed with the method of treatment. I must repeat that, in my opinion, internal urethrotomy and rapid dilatation are only means of accelerating the cure; I mean that the operation will not do away with the necessity of subsequent instrumentation for a long period of time, nor after external urethrotomy can the cure be properly termed "radical," that is to say, requiring no further treatment. All gonorrhœal strictures are the results of peri-urethritis and interstitial contraction of the infiltrated tissue. This infiltration, like a cicatrix of the skin which keeps red and thickened for a long time, may remain unaltered without there being any apparent cause for the persistence of the keloid condition. As is well known, the condition is most persistent in cicatrices of the skin after burns. The majority of the simplest cicatrices do not reach a condition of histological stability under twelve months. In scars after burns, many years elapse before the cicatrix becomes white, level, and assumes permanently a condition tending to atrophy. So also, there are strictures which we call callous, and which may remain for years in a keloid condition. Frequently this is due to some purely individual peculiarity, but it is often kept up by a very chronic gleet; perhaps also the retention of some of the gonorrhœal virus in the tissue constitutes a permanent source of irritation. It takes a very long time to get rid of this tissue by passing instruments. If incisions be made deeply on either side through the stricture, the nutrition of the cicatricial tissue will be so far interfered with, that it will more readily atrophy; but a further effect is brought about. A simple cicatrix replaces the former tissue. Now this new material is much more easily dilated; again its daily stretching does not lead, as a rule, to fresh infiltration, but rather to simple superficial ulcers which heal slowly. The conditions are the same as after tenotomy. The advantage of this operation consists in the substitution of a readily extensile cicatricial tissue for an inextensile tendon.

To suppose that club foot can be cured simply by tenotomy, is an error; an error, unfortunately, not recognised as it should be by surgeons.

Strictures occurring after chancre are troublesome on account of their inextensibility. As a rule they result from indurated chancres which are cicatrised over, and probably contain some syphilitic virus. A constant, though mildly irritable condition, is thus kept

up. The cicatrices, like those of hard chancres on the glans, take a long time to atrophy.

If the gonorrhœal infiltration around the urethra is allowed to remain quiescent for a long time, it contracts and takes on the character of atrophied cicatricial tissue. At the same time the tissue, as it becomes drawn together and closes up, forms an annular stricture. In such cases we may sometimes be lucky enough to succeed the first time a bougie is passed, in rupturing the stricture if thin and annular. The disease will then be as good as cured, and will require no long after-treatment. If the ring of the stricture be thick, it is very difficult to dilate, even when there is no keloid tissue about it; in such cases, internal urethrotomy is far more applicable than in keloid strictures, and ought to be employed far more frequently. It is always very difficult to estimate the thickness of the ring of stricture. On this point even the most experienced authorities may be at fault. I know of one case in which first Civiale and then, a few years later, Thompson had performed internal urethrotomy. In spite of the most careful after-treatment, the stricture, which probably had not been completely divided, contracted to such an extent that I was forced to begin the dilatation with the smallest instrument. This treatment, the patient with most constant fortitude allowed to be continued for two years, so as if possible to restore the normal dimensions of the urethra (the case is still under treatment). I have no doubt that even in such a case, atrophy of the cicatricial tissue will eventually occur, so that no further contraction may be feared. No doubt the same result might have been obtained more quickly by performing another urethrotomy of a more extensive nature, but the patient had rather lost faith in this proceeding since he had been operated on twice unsuccessfully. I do not consider it of any material importance whether the stricture is divided from behind forwards, or in the reverse direction on a staff; nor does it matter what instrument is used. Each surgeon will accustom himself to some one mode of operating, especially as he is not likely to meet with many cases. Therein consists really and essentially the art of the so-called "specialists," and it must not be disparaged. Generally speaking in this respect it is opposed to the character of us German professors; we consider it of more importance to test the practical value of all rational methods. A man must live to the age of Methuselah if he is to thoroughly carry out practically all the methods of operating for

calculus and stricture, even were he to adopt only those recommended by the most competent authorities. For German surgeons it requires a good deal of resignation only to operate according to one method; the French, Italians, and English do not feel this, partly because they learn and know only one method, and partly because with them the desire for stability of knowledge and its application is stronger, and is considered by them a source of strength, by us Germans one of weakness.

With regard to the results that I have obtained with external urethrotomy, I should remark that I usually determined on this operation when no other seemed admissible; I adopted it also in the worst class of cases where, though exercising my best skill, the strictures were impermeable to instruments. The results of this operation for traumatic strictures in the perineal urethra were very unfavourable. For gonorrhœal strictures they were more successful, especially when it is taken into account that of nine cases, erysipelas was the cause of death in the only patient whom I lost after this operation. External urethrotomy is especially adapted for severe cases, particularly when complicated with numerous fistulæ. It is not a radical operation according to the definition given above. When I was assistant in v. Langenbeck's clinic, I saw patients in whom the strictures had returned after operation, when they had entirely neglected the use of the catheter. External urethrotomy can only be rendered more effectual by bearing in mind the extent of the stricture, and so dividing it thoroughly with more certainty than is possible in internal urethrotomy. External urethrotomy can only be placed on a level with other methods of operating when we succeed in rendering it free from risk by aseptic treatment of the wound, but this is very difficult to carry out in these cases, on account of the great tendency of the urine to ammoniacal fermentation.

Between 1860-76, I performed external urethrotomy sixteen times; fourteen times for stricture, twice for injuries of the urethra. Eight patients recovered and eight died. Six of the deaths occurred in patients with traumatic, one from erysipelas in gonorrhœal stricture. The other death was in a case of fractured pelvis (p. 266), where the urethra had been injured by a fragment of bone.

Calculus vesicæ.

A man, æt. 63, was admitted in a condition of marasmus, with great hæmaturia. He died from perforation of the bladder, and cystitis. The bladder contained a calculus, in the centre of which was found a piece of rolled-up newspaper.

Death after lithotrity.

L. M—, æt. 24, had a rather hard stone in the bladder, measuring two and a half by three and a half centimètres. After the first sitting, numerous sharp-edged fragments were passed. The bladder contracted spasmodically on the instrument, and occasioned so much pain that an anæsthetic was given. Even when he was completely narcotised, the spasms still occurred. The evening after the second sitting, the patient suffered most intense pain; symptoms of cystitis and peritonitis developed, and he died two days later.

At the post mortem the wall of the bladder was found obliquely perforated, close to the neck. The shape of the opening showed clearly that it had not been caused by the lithotrite; I think it could only have been due to a sharp fragment of the calculus, pressed against the wall during a spasmodic contraction of the bladder.

A calamity of this nature—one that may arise whenever the stone is hard—should remind us that lithotrity is not perfectly free from risk, even when the utmost caution is exercised. Still, such occurrences are not of sufficient frequency to interfere with the favourable prognosis which can be given in lithotrity as against lithotomy. The case showed further, that even deep anæsthesia is not always sufficient to obviate spasmodic action of the bladder. In this patient the contraction was so strong, that I found it impossible to move the instrument.

All my cases (eleven) of lithotrity at Vienna, during 1868, recovered with one exception. This was a man, in whom a fragment of stone became impacted at the neck of the bladder, and led to inflammation around the organ and peritonitis. In a child six years old, lithotrity had to be abandoned, on account of the impaction of the calculus in the urethra. The patient recovered after lateral lithotomy.

Some further statistics of lithotrity and lithotomy are to be found in the 'Wien. Bericht,' 1869-70, p. 198.

Operations for Stone.

It is a well known fact that lithiasis is very unequally distributed throughout the world. Thus, in Zürich, between 1860 and 1867, I met with only five cases. In Vienna, between 1868 and 1876, seventy-four cases came under observation, not including cases which I saw occasionally in consultation, but which did not come under my treatment.[1] Most of my cases came from Hungary and lower Austria. There may be reasons for this, but it does not exactly prove that the disease is most common in those countries. The operation of lithotomy is frequently practised in Austro-Hungary, as well as in Roumania and Servia.

In the few remarks that I have to make on operations for stone, I am well aware that I have no new information to give, and that my slight experience can have but little weight. Little, however, has been written about the affection in Germany, for calculus is not often met with. My colleagues, therefore, may desire to learn the results of my experience.

In patients with stone, whose urine is alkaline and contains blood, a certain amount of preparation is always necessary, whether lithotomy or lithotrity be proposed. With pure oxalic calculi, blood often occurs in the urine after much moving about, riding, etc., without any great amount of disease of the bladder. The symptom will disappear if the patient be simply kept at rest in bed. If the urine be alkaline and turbid, containing muco-pus, and occasionally blood, a long course of treatment is necessary before operation is undertaken. We ought not to operate as long as the urine is strongly alkaline. The interesting experiments of Simon and Menzel have shown in the most decisive way that normal acid urine has no phlogistic properties, even when it is forced into the tissues. Alkaline urine becomes exceedingly phlogogenous, and at times will cause downright gangrene. Simon thinks that this latter effect is only produced when the urine is extravasated in such quantity that it forcibly stretches the tissues. But the same thing happens when only a small amount escapes; the phlegmonous inflammation is in part set up by the ammoniacal ingredients, and in part extends by the ferment. I have already (p. 261) pointed out the remedies

[1] In the General Hospital at Vienna there is a distinct department, under the charge of a special professor, for diseases of the urinary organs. [Ed.]

which are most effective against ammoniacal fermentation of the urine. I must add here, that the object in view is very difficult to obtain in many cases of calculus, and is not always possible when the surface of the stone is porous and rough, for the reason above given.

Perhaps the best method consists in constantly washing out the bladder with faintly acid solutions. But the pain of this treatment is often more than the patients will stand.

There is another condition which would render it impossible to keep the urine acid. It may be that the area where the fermentation is set up and the bacteria are generated, is situated in the substance of the kidney. The urine will then be alkaline almost as soon as it is secreted. Sometimes, too, the mucous membrane if much diseased will not stand a great amount of acid, yet before any operation is undertaken, the urine not only ought to be acid, but ought to remain so for at least twenty-four hours at the ordinary temperature of a room. If it becomes rapidly alkaline as it passes from the bladder into the tissues, nothing will be gained. As I have already said, it is not always possible to succeed even after weeks of treatment, and I have often had to be satisfied if I could get the urine neutral or faintly acid for a short time.

As to the contra-indications for lithotrity, I can only agree with English authors. Lately, I have preferred to administer an anæsthetic when the patients are sensitive, and extend the sittings to twenty or twenty-five minutes. In many patients the bladder is so little sensitive that no anæsthetic is required. If the urine escapes during the operation I inject warm water into the bladder, otherwise, as a rule, I do not. When possible I cause the patient to avoid passing the urine for two hours before each sitting; the bladder will then be found sufficiently full to admit of operation. The interval between the sittings should not be more than three or four days. If sharp cystitis occurs, the interval between the sittings must be made shorter; the operation then requires to be performed with especial tenderness. The increase of the cystitis is nearly always the result of the irritation set up by pointed fragments of stone. I continue the internal administration of the acid up to the end of the cure. I know only of one patient among my cases of lithotrity in whom the disease recurred.

Unfortunately, we shall not be justified in the hope that severe cysto-pyelitis due to calculus, will disappear quickly after the

removal of the stone. An annual visit to Carlsbad is of advantage in such cases.[1]

Lithotomy.

On anatomical grounds I have a distinct preference for median lithotomy, and this is the operation for stone with which I have had most success. Lateral lithotomy gives rather more room, and is especially adapted for children with large calculi. It is always a good plan to measure the stone beforehand. There are few more unpleasant surprises than to cut down upon a stone, and find that it cannot be removed on account of its size. In two cases I adopted with advantage the high operation, which has been recommended for stones whose various diameters are not less than one inch and a half. It is quite true that in the high operation, the incision can be carried so far down on either side of the bladder, as almost to bisect the viscus; still it is always difficult to grasp and extract the stone; the wound through the superficial parts must be very large, so that the injury inflicted is very considerable. This operation finds no great favour with me, although formerly, when I was fortunate enough to be v. Langenbeck's clinical assistant, I was very much taken with it, and it appeared to me to be the ideal of an operation for stone. The cases of supra-pubic operation in children, performed by v. Langenbeck's masterly hand, did well eventually, but there was much sloughing of the cellular tissue in the neighbourhood of the wound. After the slough separated the wound granulated up well and closed rapidly, but, the children were always very ill after the operation, and suffered far more than when subjected to median or lateral lithotomy. After these latter operations the parts healed up, in the majority of cases very rapidly, sometimes, indeed, by first intention. Children are scarcely upset at all, but are well almost from the moment of operation. As may be supposed the cases do not always run such a favourable course; indeed, this is shown in the records of my own clinic.

To enable the urine to flow away easily through the wound, all kinds of methods have been adopted. In unfavourable cases the

[1] This essay is contained in the 'Wien. Bericht' for 1871—1876, published at Berlin in 1879, and relates to practice before litholapaxy was introduced. See infra, p. 279, for remarks on Litholapaxy. [Ed.]

mischief is always attributed to urinary infiltration. I rather doubt the accuracy of this view. In those who have died after lithotomy, low (jauchig-eitrig) phlegmonous inflammation will be found extending from the wound along the retro-peritoneal tissues. The same form of retro-peritonitis is seen after removal of the rectum, where, at any rate, the urine is not concerned. The real explanation of the condition in this as in nearly all other forms of phlegmonous inflammation, is to be found in the retention and decomposition of the secretions of the wound. If the cellular tissue be loose, as in old people, the inflammation will spread all the more rapidly. The tough, fatty tissue in children is most capable of resisting the process. Experiments prove beyond doubt that very little ammoniacal urine is sufficient to set up rapid decomposition of the secretions of the wound; the most dangerous condition therefore, is when such urine cannot be kept from contact with the wound. When the urine has its normal acidity, it is first rendered alkaline by the decomposed secretions of the wound. Experiments show again that this change can rapidly be brought about (see the section in my work 'Coccobacteria Septica' on Experiments on Infection and Transplantation). The disinfection of the urine, by which expression I here mean the cessation of its ammoniacal fermentation, cannot always be effected, as I have already mentioned. In such cases therefore, it might be right to apply an occlusion dressing. A catheter passed in through the urethra, and tied into the bladder, together with drainage tubes in the wound may also be desirable. The bladder, as also the wound, can then be washed out frequently through the drainage tubes. When the urine is of normal acidity, there seems to me to be no objection to passing several drainage tubes deeply into the wound, and then applying a Lister's occlusion dressing. A Nélaton's catheter should be kept in the bladder so that the urine may flow off constantly for the first three or four days, until the edges of the wound are covered with plastic effusion and there is no more danger of their being infiltrated with the secretion.

The period of healing will thus be much shortened, even though it should not always take place by first intention. I have not lately had an opportunity of trying this method. I should have the more confidence in it since watching the progress of a case in which I had removed a myoma of the bladder[1] by incisions made as for

[1] This case will be found in the 'Arch. für Klin. Chir.,' Bd. xviii, p. 411.

high and lateral lithotomy. In this case, I had an opportunity of seeing how readily wounds of the bladder will heal, when by the continual free escape of urine the viscus is practically converted for the time into an empty tube.

Although it may seem highly heretical to many of my colleagues yet I cannot forbear from saying a word or two on the possibility of dissolving vesical calculus. I once saw in consultation with v. Pitha an old gentleman, who produced a large box containing a collection of angular fragments of calculus. V. Pitha, who had had the patient under his treatment for a long time, handed the box to me without any remark. I naturally supposed that the fragments were the result of numerous successful crushings, and I was not a little surprised therefore, to hear that the patient had never been operated on, but that the fragments of stone had been spontaneously evacuated while he was undergoing treatment at Carlsbad. V. Pitha had declined to operate on the patient, on account of the amount of vesical catarrh. Examination of the débris showed it to consist of broken shell-like fragments: the surfaces of fracture were laminated and it was evident that the calculi were not a collection of small stones, but portions of a large one. The stone had broken up into such minute pieces, that most of them were passed with the urine, although the expulsive power of the bladder was feeble.

In the atlas of "micro-geology" by H. Meckel v. Hemsbach,—unfortunately not published—and in the very rich collection in my clinic, which consists principally of stones collected by Dr. Reyher of Cairo, I find numerous calculi, some of which show very distinctly a tendency to break up in a radiating, some in a concentric manner. Others show both forms of disruption. I should, under other conditions, scarcely have believed that this disruption could have led to so extensive a breaking down as occurred in the above case.

I think that I have sometimes seen fragments of stone left after lithotrity, especially when consisting of triple phosphates, disappear under the constant administration of acids. In several instances, where a week previously there had been numerous small fragments, repeated examination failed to detect anything in the bladder. It is possible that one is deceived in such cases, and that the urine was not all filtered with sufficient care, but in some instances, the circumstance was too striking to escape notice.

There is nothing so very curious in the fact that substances,

occurring in the fluids of the body, may become combined together and be insoluble, but may return again to a soluble state as the secretions and fluids alter. Physiological and pathological formation and absorption of bone shows us that this can happen.

Litholapaxy.[1]

With the general introduction of anæsthetics attempts to prolong the sittings in lithotrity went on hand in hand. Every one who has performed lithotrity knows that the operation has something exciting in it—almost like a hunt. The operator feels the stone and thinks he can seize it; it slips away, is again sought for, and so the process goes on. Under an anæsthetic the surgeon is able to work more quietly, and thus naturally was led to prolong the sittings. Another circumstance which tended to the same end was that, in recent times, attempts to remove the fragments directly after lithotrity had met with more and more success. This was accomplished by means of the so-called evacuation catheter which had large openings on the concavity, the convexity or the sides of the instrument; narcotism again, favoured this endeavour. Subsequently, special apparatus was made use of in order to suck out the fragments and the grit.

With the help of technical improvements, it was no long stride from this stage to the present method of crushing the stone and removing it when possible, at a single sitting. Two years ago, an American surgeon, Bigelow, made known the method which he termed litholapaxy. Bigelow's description must astonish everybody; he speaks of successful lithotrities, in which the patients had been kept under a narcotic for three hours. The illustrious Thompson has lately developed this principle still further.[2]

With regard to my own experience of lithotrity at a single sitting, I have as yet only six cases to record; for a critical judgment of the method, the respective values of these cases differed, inasmuch as the stones varied much in size and hardness. The first crushing

[1] From the 'Wien. Med. Woch.,' No. 44, Oct., 1880, being an extract from a paper by Prof. Billroth, read before the K. K. Gesellschaft der Aerzte, in Vienna, on Oct. 22nd, 1880.

[2] 'Practical Lithotomy and Lithotrity,' 3rd Ed., 1880, p. 182.

operation I performed, with the distinct intention of completing it at one sitting was on the 8th June, 1879, on a man, 59 years of age. The stone measured three centimètres in diameter, and was composed of uric acid and urates; the operation lasted forty-five minutes. The second case was that of a man, æt. 45, who was operated on on the 10th May, 1880; the stone was phosphatic and measured two centimètres in diameter. The operation lasted twenty-three minutes. In the next two operations the stones were the largest I have dealt with by this method; one of them was a hard, uric acid calculus, measuring three and a half, the other four centimètres in diameter. The first operation lasted fifty-five minutes and the second two hours. In the fifth case the stone was phosphatic, and measured two and a half centimètres; the operation lasted thirty minutes. In my last case, the stone measured one and a half centimètres and lasted fifteen minutes.

The estimate of the diameters of the stones was taken from the scale on the lithotrite. It is not easy to judge of the size of the calculus from the expelled fragments. The size of the stone, which as a rule one is apt to under-estimate considerably, may be determined in the following way; the *débris* is filtered through calico into a urine glass; the fragments that remain on the filter are then collected in the cloth and firmly pressed together. By taking into account also the measures of the different diameters, the shape may be determined more or less accurately. Of course this gives only an approximate measurement, but I may state that by the use of this method, I have observed that very often I had under-estimated the size of the stone from the fragments. I have often thought that the whole stone could not have been removed, for the fragments did not seem in proportion to the measurements.

In all the cases mentioned, the febrile reaction was trifling. The patient in whom the operation lasted for two hours had a rigor subsequently, but this was of a purely nervous character, and without any increase of fever. Such rigors are common enough after operations on the bladder. Some of the patients were well enough to be discharged in from ten to twelve days. In order to determine whether any fragments had been left, I make an examination after four or five days, and repeat it on three separate occasions at intervals of two days, sometimes with a full, sometimes with an empty bladder. If I find no fragments at the third examination, I feel pretty well at ease, but it is even then by no means absolutely certain that there

is nothing left. I have heard by letter from patients in whom four weeks after the operation small fragments have come away. In any case we are able to learn by the repeated examinations whether there is anything in the bladder that requires crushing, for stones which cannot be felt, even after repeated sounding, could scarcely be seized with the lithotrite. The operation obviously must be looked upon as completed, when no more fragments can be felt, but still there is always a possibility that we may be deceived, and that the fragments cannot be felt, because they are enclosed in clots of blood, so that there is no ring when they are struck. However, nothing of the sort occurred in any of my cases.

I must further state that this method is distinctly deserving of very earnest attention. It is a decided step in advance, and very convenient for the patient, that one sitting only should be necessary instead of three or more; the more so, that the results, as given by Thompson and Bigelow are, on the whole, better than those shown by the earlier methods.

In my opinion, if we exclude all severe cases of cystitis and cysto-pyelitis, in which no operation for stone is admissible, the danger does not lie in the formation of pus, nor in the loosening of the mucous membrane and consequently easily excited hæmorrhage, but in the strongly ammoniacal contents of the urine which may be free or united with carbonic acid, and secondly, in the septo-diphtheritic character which such cases generally assume. In a bladder with strongly ammoniacal urine, as is known to pathological anatomists, the lining membrane is much reddened, while on its projections are often seen small shreds of dead tissue, to which fibrinous clots are connected. This makes it appear as though the process were of a diphtheritic nature, and it has also the same character in another respect, viz. that it is highly dangerous for the urine and secretion of the bladder to penetrate into the substance of the mucous membrane, or into the surrounding tissue. It does not matter how this is brought about; it may be due to the inflammation alone, or the mucous membrane may be defective between the pouches of the rugæ, thus allowing some urine to ooze through, or small excoriations may have been caused by the lithotrity; in any case the condition will assume a diphtheritic type, which spreads about the neighbouring cellular tissue. Unhealthy suppuration with a tendency to rapid progress, pericystitis and peri-urethritis may be set up, and these processes assume a virulent

character from the commencement. The point of the whole question amounts then to this; how can we get rid of ammoniacal fermentation in the bladder? That is the preliminary condition required for success in a long lithotrity. Until the ammoniacal urine is got rid of, lithotrity generally, and especially that in one sitting, is, according to my views, contraindicated, for it is in the highest degree dangerous.

Hypertrophy of the Prostate.

Among forty-six cases I only met with one in which I was unable to pass the largest sized catheter into the bladder. The patient had complete retention. I was induced at length to try forcible catheterisation with a straight instrument—an operation which has been recommended by excellent surgeons, especially by Dupuytren. My attempt was unsuccessful; the instrument bent and did not penetrate the prostate gland. Retro-peritoneal infiltration of urine followed and the patient died. I do not advise any one to follow my example. In such a case puncture of the bladder by the rectum would have been the proper proceeding. In addition to this case, seven of these patients died in the hospital of uræmia, marasmus, and diphtheritic inflammation of the bladder. The others were sent out after they had been taught to pass an instrument for themselves, and earnestly advised to evacuate the bladder completely by means of it every day. Formerly, I used to advise these old men to procure metallic catheters. Lately, I have made them practise passing soft caoutchouc instruments (the so-called Nélaton catheters). These instruments can often be introduced into the bladder in cases of hypertrophied prostate with astonishing ease, while the metallic catheters sometimes give trouble. The solidity of the metal catheter is an advantage.

Inability to pass the water and great catarrh of the bladder with alkaline urine, were the most frequent causes for which the patients came to the hospital. The treatment of this vesical catarrh has already been discussed. (Supra, p. 261 *et seq.*)

Twice I found the bladder full of half coagulated blood. By injecting a good sized stream down a catheter, I managed to pump it out; in both cases there was inability to pass the urine for some

weeks. It seems remarkable to me that Thompson advises blood in the bladder to be left undisturbed. He states it will become fluid by degrees without decomposing, and can then be easily evacuated by the catheter.

In the case of a gentleman living at Pesth, to whom I was called in consultation, I was unable to pass a catheter. In addition to the enlarged prostate, there were false passages, and the patient was in a very low and weak state. We punctured above the symphysis. I never saw this operation done by my teachers, and this is the only occasion on which I have performed it myself. I heard subsequently that the patient died two days later.

A rare case of prostatic abscess came into the hospital at Vienna. The patient was sixty-five years of age. The abscess perforated the peritoneal cavity and the man died of peritonitis.

Vesico-Vaginal Fistula.

While at Zürich I met with fifteen cases of this nature. Two were cured by the application of caustic potash. On twelve others I operated successfully; one left at her own request, before the treatment was completed. In the old days these results would have been considered remarkably brilliant. Since we have learned more about the operation, and understand better how to refresh the parts and insert the sutures, success is far more common than failure. It is a curious fact that the cure of vesico-vaginal fistula has not been brought about by any new methods of treatment, but only by increased care in the simple matter of inserting the sutures, a valuable hint for many other operations. I commonly employ silk sutures, for I find that they answer just as well as wire, and are more easily removed.[1]

[1] Some further remarks on my method of operating, which may possibly differ in small particulars from that of others, will be found in Dr. de Montmolin's essay "De la Fistule Vésico-vaginale." Neuchâtel, 1864.

Extroversion of the Bladder and Epispadias.

Previous to 1871 I had had no opportunity of treating any of these cases. It seemed to me—as it has also to many others—that the sacrifice of time, and the pain incurred by the patients were wholly out of proportion to the results obtained. Since that date however, I have been successful in a few cases, and there is now no doubt that as time has gone on the principles and method of operation have greatly improved. The length of treatment, too, is less than it was. It is true that we cannot restore the functions of the malformed parts completely, but we can materially improve the condition of these unfortunate individuals. We are not able always to render male patients with this malformation capable of coitus. I do not well see how we can do so; still it is by no means certain that a future generation of surgeons will not achieve this result. After the bladder is covered in and the urethra formed, the patient may be considered cured, so far as the plastic operation is concerned, but the further difficulty arises of providing by artificial means for the retention of the urine. Herein the prothesis has to fit in with the operative result, or *vice versâ*. These are purely technical difficulties, which can and must be solved.

The cases are so rare that one cannot arrive early at any definite conclusion. Up to the end of 1876 I had operated on nine persons with extroversion of the bladder, and epispadias; three died; one was sent away unimproved; four were cured; one is still under treatment. One of the fatal cases was of considerable interest; the cause of death was pyelitis, an affection which seems to be distinctly connected with extroversion of the bladder.

The case was that of a man, æt. 28, who had frequently passed pure pus from the right ureter before the operation. Whenever this symptom occurred, the patient felt ill and had pains in the neighbourhood of the kidney. The urine coming through the other ureter was normal and contained no pus. I had several times operated on the patient after my own method, and the only thing that remained to be done was, to close the so-called "funnel" at the symphysis. An attack of erysipelas followed the operation; the wound became diphtheritic, and the urine strongly ammoniacal. The patient withstood the disease three weeks before he finally succumbed. The post mortem revealed extensive pyelitis on the right

side, and a slight degree of the same condition on the left. The right ureter and the pelvis of the kidney were immensely dilated; the former especially was dilated and convoluted to a degree that one would expect only to find when the passage of the urine had been materially obstructed by stone or stricture, for years. I was surprised on finding this, when I remembered how well my patient had gone on after the previous operations. The most minute examination failed to detect any contraction in the course of the ureter, or at its orifice. There is no doubt that the source of the mischief lay in a sharp bend of the ureter just before it opened through the posterior wall of the bladder which bulged forwards owing to the malformation. The effects that may be induced by such twists and bends have been described by Wölfler.[1]

The degree of bending must vary much in different cases, otherwise every adult with extroversion of the bladder would be the subject of pyelitis. Now that attention has been called to this complication, it will probably be more frequently observed. At the time of writing (1878) I have under treatment, a child twelve years old, with extroversion of the bladder, who suffers from pyelitis of the right side. After every operation there is an exacerbation, especially when the urine becomes alkaline. In another case, too, in which I had successfully covered over the defective bladder with flaps, the whole improvement was lost after an operation to close a fistula that was left. The urine became ammoniacal and it was evident that diphtheritic inflammation had attacked the posterior surface of the new formed covering to the bladder. The inflammation took on a destructive character; first the cicatrices gave way and then the flaps themselves were destroyed.

At first I used to cover over the extroversion by paring and uniting the abdominal walls after previously detaching the bladder from them. Then, for a while, I tried making two lateral pedunculated flaps from the abdominal wall. Now I have come to the conclusion that the best method is to dissect up two broad, lateral, doubly-pedunculated flaps, whose narrow parts lie above and below. After ten or fourteen days, when the under surface is granulating well, I unite the two in the middle line without cutting through the peduncles. If the flaps be sufficiently broad, there is no need to unite them by their outer edges; these lateral openings close spontaneously in from five to six weeks. The bladder is thus

[1] 'Wien. Med. Woch.,' 1876, p. 295.

completely covered in, but an opening should be left at the umbilicus through which the urine may escape until the urethra below is completely formed; then the umbilical opening is closed, and it heals up as the urine escapes below by the newly-formed passage. I intend to describe this method more minutely and with the aid of illustrations hereafter, when the number of my cases is somewhat larger.

The flaps must be made very broad, that is to say in an a dult they should be at least six centimètres broad in the middle and about five at the upper and lower parts. In a child of course they should be somewhat, but still not so very much, smaller. The flaps should be so completely detached as to overlap each other for about half their width; a sheet of tinfoil is then laid underneath them in their whole length. In a few days they approximate so much that their curved shape becomes straight; later on, notwithstanding a certain amount of rigidity, they will readily unite in the middle line. A broad surface must be made by scraping away the granulations and the superficial developing epidermis from the edges. At first I suspected that this median cicatrix might possibly give way as the bladder was pressed forward, so that a sort of vesical hernia might form, as happens occasionally under similar conditions after laparotomy; I have, however, a case under observation which was cured five years ago, and which satisfactorily proves that such a fear is groundless.

The wounds of the abdominal wall, after the formation of flaps on both sides, are of rather formidable size; the hæmorrhage can easily be controlled. If the flaps be made too small, a strip of the tissues, either about the centre or above it, is apt to slough. Such an occurrence will seriously depreciate the result. A further disadvantage of making the flaps too small is that lateral openings will be left which are very difficult to close.

We are constantly trying to improve the apparatus to provide for the retention of the urine. A form of apparatus adapted to one of my cases (a child six years old) will be best understood from the illustration (Plate IV, figs. 7 *a* and 7 *b*).

I do not think that these operations should be undertaken before the age of about four, for, in my method of operating, the first proceeding is of a very formidable nature. The only object in operating earlier lay in the hope that the symphysis might spontaneously close after the operation, just as the fissure in the alveolar process closes up after operation for hare-lip. It was thought too that pos-

sibly the union of the symphysis might bring about also the closure of the sphincter vesicæ. I do not think that this expectation will be fulfilled as long as the penis is not detached from the ends of the symphysis and allowed to sink back. The completion of the operation when children are about four years old, will always have the advantage that as the prolapsed bladder is covered up, the little patients avoid a part of the distressing effects of this malformation; but it requires an intelligent person to apply and constantly wear with due care the required apparatus. Such intelligence can hardly be looked for before the patients are ten or twelve years of age. Further experience is necessary in order to prove whether the pyelitis with which extroversion of the bladder is in so many cases associated, can be improved or cured by the operation. I do not myself feel very hopeful on this point. I hope there are many of my colleagues like myself, who take a special interest in gradually overcoming difficulties which at first seem invincible. The records of what I have been able to achieve are to me as so many sign-posts pointing out what still remains to be striven for and attained.

I learn, through the kindness of Dr. J. Mikulicz, that Prof. Billroth's experience of these operations since writing the above has not been of a very encouraging nature. Some of the patients operated on died of cysto-pyelitis, and this complication seems on the whole to have justified the rather gloomy forebodings expressed in the above pages. For the past two years Prof. Billroth has not operated on any of these cases.—[Ed.]

CHAPTER XIII.

DISEASES OF THE MALE GENERATIVE ORGANS.

Case of serpiginous syphilitic ulceration. Cases of cancer of the prostate—Removal. Case of hydrocele with thickened calcareous sac. Radical treatment of hydrocele. Remarks on chronic inflammation of testis. "Tubercular testis"—Treatment. Chronic orchitis leading to suppuration. Castration. Cases of malignant sarcocele. Remarks.

Serpiginous syphilitic ulceration.

E. W—, æt. 33, had contracted twenty-seven months previously a chancre at the orifice of the urethra. This was followed, after three weeks, by enlarged inguinal glands which rapidly ran on to suppuration. Ulcers formed about the scrotum. The ulceration and suppuration extended until almost the entire scrotum and the skin of the lower part of the abdominal wall were destroyed. Whilst infiltration appeared at one part, the ulceration healed at another; at the margins of the cicatrices fresh infiltration constantly appeared, and broke down. Inoculation of the secretion on the arm gave rise to the same infiltration and ulceration. The greater part of the ulceration healed up after the application of caustic potash.

Carcinoma of the prostate.

I met with one case of this nature at Zürich in a man, æt. 30. In the course of five years the tumour had reached the size of a duck's egg. It was very soft and could be felt in the perinæum and the rectum. I extirpated the growth, but found that the tumour had partly extended into the bladder, and was forced to make a lateral opening the size of a shilling, in order to get it all away. The wound healed up completely, but unfortunately recurrence began in the cicatrix after two months, and the patient died about a year later. The growth proved to be a soft, alveolar cancer, ulcerated and breaking down on the vesical surface.

Another case which came under my care in Vienna in 1873 did not unfortunately meet with such good success. The man was 56 years of age. He died four days after the operation from septic phlegmonous inflammation of the retro-peritoneal cellular tissue.

Hydrocele.

In one case of this nature we found a number of spermatozoa which were precipitated in the glass, and showed active movements after a long period of time. An iodine injection was thrown in and the patient recovered.

Hydrocele with a much thickened tunica vaginalis.

A man, æt. 51, stated that after a blow received when he was very young, the right testis became harder and larger than the left. The swelling had slowly increased for ten years previous to admission; three months previously it broke spontaneously. Since that time some thin, purulent fluid had escaped. The tumour was the size of the fist and of almost bony hardness. I made an incision through the skin and with the bone pliers laid open the tunica vaginalis, which was covered on the inner surface with layers of calcareous deposit; most of these were removed and the rest were thrown off by the subsequent suppuration.

Radical Treatment of Hydrocele. (W. B.)

Although I have performed the radical operation for hydrocele on 128 patients, my records are so far insufficient that I can only state the exact details in sixty-seven. Of these, the hydrocele was on the right side in thirty-three, on the left in twenty-four, while in ten it was double. It is well known that hydrocele is met with in new-born children, and as the oldest of the patients on whom I operated was seventy-seven, we may fairly say that no age is exempt. My impression is that individuals between the ages of thirty and fifty are most liable to the affection, but formerly I kept no notes on this point, and must leave it to others to confirm or refute my statement. Nor can I furnish much information on the etiology of the disease. In the majority of cases the patients are unable to give any minute account of the period of origin. By dint of cross-examination we can sometimes make out that there was a blow or

pressure; sometimes that gonorrheal orchitis preceded the hydrocele by a few years; but this is not of such common occurrence that we should be justified in assuming that because gonorrhœa and hydrocele are common affections, there is any etiological connection between the two. In fact we must admit that in the majority of cases the causes of origin of hydrocele are perfectly unknown.

I have never operated in hydroceles in children, for the affection almost invariably disappears spontaneously. The youngest patient on whom I operated was fourteen years of age. He had a hydrocele of the spermatic cord.

My teachers, Baum and v. Langenbeck, instructed me that any ordinary form of hydrocele could be cured by puncture and injection of iodine. V. Langenbeck saw the affection return in a few cases, and thereupon employed chloroform injections for a time, but recurrence followed also after the use of this remedy. Baum told me in conversation once, that when recurrence took place after the iodine injection it was either due to some defect in the method of operation, or to the fact that the iodine solution was badly prepared.

The process of cure is, that the iodine forms a precipitate in the tunica vaginalis; there it remains for a long time undissolved, and leads to shrinking of the membrane. No further effusion can therefore occur. It is erroneous to suppose that injection of iodine always causes complete adhesion of the inner surfaces; partial adhesions may at times form, but this is not the main thing. The shrinking of the tunica vaginalis, is the reason for the cessation of the secretion. The results of iodine injections for hydrops articuli, hydro-nephrosis, or into ovarian cysts, show that the opposing surfaces do not become united together; if this were the case the result of this treatment for hydrops of the knee would always lead to ankylosis of the joint; it is obvious that complete adhesion of the synovial surfaces would produce perfect immobility.

When I was younger, curiosity led me at times to try other methods of treatment; thus, in two cases of hydrocele I employed electrolysis; in one of the cases the condition returned as before.

In 125 instances I used iodine injections and none of the patients came back to me with recurrence of their complaint; it was of course possible, that in one or two the affection returned, and that they sought other advice. I doubt it, for people with recurrence of tumours or chronic inflammations nearly always came back to me.

I may add that during my whole surgical experience no patient has ever come before me with a hydrocele recurring after it had been tapped and injected with iodine by another surgeon.

A few surgeons lately have revived the treatment of hydrocele by incision, and speak well of the results obtained under antiseptic treatment. When I was a student this method of treating hydrocele was considered antiquated and uncertain; the few cases where the affection returned after operation were those in which incision had been adopted.

My method of treating hydrocele now is as follows:—I evacuate all the fluid, and then inject two ounces of a mixture containing equal parts of our officinal tincture of iodine and water; the tincture of iodine is always freshly prepared. This mixture I allowed to remain in the tunica vaginalis for five minutes; meanwhile I manipulate the sac in such a way as to bring the fluid in contact with every part of the lining membrane. If there is any pain I allow all the injected fluid to escape; if there is no pain I leave a quarter or a third of the fluid in the sac.

It not infrequently happens that the day after the operation the tunica vaginalis is found to contain some gas. This may have got in at the time of operation, and become expanded by the temperature of the body, or it may be the vapour of the alcohol and iodine. There is never any occasion to evacuate this gas, for it will always be absorbed without trouble.

Inflammation of the Testis.

Cases of epididymitis and orchitis which were neither of gonorrhœal nor syphilitic origin were usually designated as "tubercular testis." I have endeavoured to substitute for this name the general term of "circumscribed chronic (caseous) orchitis," for the expression "tubercular" compels us too much to assume that this disease is etiologically connected with the tubercular diathesis. This is by no means always the case. By reason of the anatomical arrangement of the separate lobules of the testis, disease of one division of this gland does not readily extend into another. The formation of nodules in the testis is scarcely ever due to the coalescence of numerous small miliary nodules into one large mass; the limitation results from the strong septa which partition off the gland into

separate divisions. The lymphatics pass separately out of each division to the spermatic cord, through the corpus highmori, so that the lymph of the venous blood and the secretion of the gland all flow out in the same direction. It is more difficult to explain the formation of nodules in the epididymis. I think that the irritating effusions are stored up here and there with the lymph in the lymphatics; these latter are—like the veins—much convoluted, being often bent on themselves and forming loops, and from them the irritation spreads to the surrounding parts. So far as I know, it has not yet been proved that these nodules in the epididymis are composed of miliary tubercle. Traumatic, functional, or infective irritation may give rise to the formation of such nodules: of this I have no doubt. In tuberculous subjects the condition very rarely gets well of itself. On the other hand, we can hardly presume that the tuberculous diathesis exists in cases where such nodules are found in a strong healthy man without any family history of tubercular disease. If there has not been any previous gonorrhœal or syphilitic infection, or any traumatic cause, we shall be left completely at a loss to determine the etiology.

The patients are rarely able to give any minute information about the origin and gradual increase of this affection. The nodules pass unnoticed at the outset, and often remain for years without any alteration after they first attracted attention. Softening and enlargement is nearly always a sure sign that the growth is about to suppurate and break through, but the process may take months to accomplish. Very frequently two or three of these nodules, varying in size from a bean to a walnut, form close to each other; not infrequently the disease attacks both glands.

If I meet with indolent nodules of this description in subjects otherwise healthy, I adopt no treatment and advise the patients not to trouble about the matter. If some remedy be thought necessary I prescribe iodine inunctions or compresses soaked in Lotio Plumbi. I have never seen these nodules disappear spontaneously and consider them incurable. Once only, at the urgent request of a patient, I removed a growth of this description, although it was neither softened nor ulcerated. The patient—a strong man—had become impotent; he was informed by his medical attendants that the condition was due to the pressure of the nodules on the vas deferens. In such cases, simple pressure on the vas is but rarely met with: far more frequently the larger

spermatic ducts and epididymis are involved in the degeneration, and so rendered impermeable. Generally, however, even when the disease affects both sides, a number of the spermatic ducts, sufficient to effectually prevent impotence, remain pervious. In the case above mentioned, I acceded ultimately to the wish of the patient, although I openly expressed my doubt whether the operation would have any effect on the impotence; I laid open the scrotum on both sides, drew out the testes, carefully removed the nodules, replaced the organs, and then sewed up the wound in the scrotum. All the parts healed up by first intention; the operation and the rapid healing had an additional interest for me in that it was the first that I performed under the antiseptic system. This was in the spring of 1875. Notwithstanding repeated attempts, I was unfortunately unable to learn whether the operation had the desired functional effect. Where no impotence existed, I should not advise an operation of this nature; we might be unlucky enough to injure the few spermatic ducts still remaining pervious. The affection is so indolent, and the nodules remain stationary for so long in many of these cases that the patients are seldom induced to demand operation. No doubt there are individuals who become deeply hypochondriacal from the idea that these nodules may cause impotence, and so are very anxious to get rid of them.

The conditions are different when the nodules are softened and fluctuating, or when they have already broken externally and it becomes necessary to cure the sinus. Such cases are most probably associated with a tubercular diathesis. If bronchial catarrh is present or the apices of the lungs are already infiltrated, it is better not to resort to any operative means. The suppuration in any case is usually but slight after spontaneous opening, and may be still further limited by repeated energetic cauterisation of the sinuses at intervals of fourteen days or so. Under this treatment the sinuses occasionally close, but such a result cannot as a rule be looked for. If there is no distinct proof of any tubercular disease in other organs, I enlarge the sinuses with laminaria or the knife, scrape out the abscess walls with a sharp spoon, and then introduce charpie soaked in Liquor Ferri and dried, and wait until it is thrown off by suppuration. Not infrequently a cure is obtained in this manner. Castration is only suitable for cases where the testis is studded with numerous softened nodules, and where after some months the thickened walls of the cavity have shown no tendency

to retract. Even in such, perhaps, the condition may be just as well left as it is.

Chronic Orchitis going on to Suppuration.

I saw no instance of this disease in Northern Germany; I cannot say whether this was a coincidence or whether it is of rare occurrence there. At Zürich I met with nine cases, occurring in men between the ages of twenty-one and sixty. The disease usually occurred in healthy subjects and generally without known cause, though in one instance it followed a blow. Abscesses slowly formed in different parts of the parenchyma which became filled with cheesy pus and lined with spongy granulations. The process may go on for years without giving any pain. It usually leads to complete destruction of the testis without materially affecting the general condition. In two cases the disease had existed for twelve and fifteen years respectively. Twice I opened up the largest of the abscesses, scraped away the spongy granulations, and applied compression by means of strapping. The sinuses healed up, but whether fresh suppuration occurred later I do not know. In none of these cases had the patients any pulmonary disease, nor was there any history of gonorrhœa or syphilis. This form of chronic orchitis can often only be diagnosed by the history of the case; sometimes even by anatomical examination it cannot be distinguished from tubercular or syphilitic orchitis. It always seems to me as if in Switzerland the affection occupied the place of tumours of the testis. It is remarkable that, during a period of seven years and a half at Zürich, I met with no case of cystic or enchondromatous disease of the testis, and only three cases of malignant affection of the organ. At Berlin no semester passed without many coming under observation.

With regard to the operation of castration, I may remark that in two cases I divided the cord with the écraseur. The division was performed very slowly, yet hæmorrhage came on in a few hours in both cases. This shows, at any rate, that the method is unsuited for private practice. I usually tie the vessels singly after cutting through the cord, but I think that they may just as well be ligatured *en masse*, provided that a sufficiently strong thread be employed.

Malignant (?) tumour of the testis.

J. B—, æt. 53, had received a blow on the right testis a year previously. Since then the organ had slowly enlarged, and when admitted it was the size of two fists. The growth was removed. It consisted of a tough fibrous capsule the thickness of the finger, containing blood-stained serum. On the inner surface of the cavity were shreds of tissue; traces only of the parenchyma of the testis were found in the capsule. The histological report left it uncertain whether the tumour was a softened carcinoma, an altered extravasation of blood, or both together. A year later the patient was quite well.

The following case is remarkable on account of the age of the patient:

F. D—, æt. 11 months, was admitted for a tumour of the left testis which had commenced two months previously without known cause. Fluctuation was distinct in parts; an incision was made and let out a little pus, but the tumour only partly collapsed. Fungating granulations sprang out of the incision and the inguinal glands became enlarged. The mass was removed and proved to be a medullary cancer.

Between 1860 and 1876 I met with twenty-six cases of tumours of the testis. No instance of cystic or enchondromatous tumour came under my notice. In examining these growth with the microscope I was often in doubt as to whether they were sarcoma or carcinoma. The peculiar structure of the gland causes most of the growths which originate in it to assume a lobulated, cancer-like alveolar nature. The tissue of these new formations is usually soft. It is often impossible to say whether the new formation originates in the soft, delicate cellular tissue of the organ, from the endothelium of the lymph sinuses contained therein, or from the epithelial cells of the seminal ducts. The rapid fatty degeneration and softening and the hæmorrhagic infarcts occurring in these new formations render the examination still more difficult. It is most desirable that this subject should be thoroughly worked out.

CHAPTER XIV.

DISEASES OF THE FEMALE GENERATIVE ORGANS.

Case of prematurity. Case of polypoid growths of the vagina and urinary bladder in a child. Case of ovarian cyst. Large uterine fibroma containing central cyst. Doubtful ovarian tumour treated by iodine injection. Ovariotomy—Remarks on 140 *cases. Laparo-hysterotomy. Recent modifications in method of operating* (1881).

Prematurity.

R. A—, æt. 4. From birth the breasts were noticed to be rather largely developed. When first seen they were of a size corresponding to that usually seen in our climate, in girls of sixteen or eighteen. When three and a half years old there was some muco-sanious discharge from the vagina lasting several days. This was distinctly not due to any injury. Menstruation had not occurred again since that time. On the mons veneris and the labia majora light hairs half an inch in length were seen. Per rectum a movable body, about the size of a walnut, could be felt which probably was an enlarged uterus. In other respects the child physically as well as mentally was normally developed for its age.

Papillary polypoid vegetations of the vagina and urinary bladder in a child eighteen months of age.

The case was one of a very peculiar nature. According to the parents the child's health had been perfectly good up to two months previously. It then had pain during micturition, and mucus, pus and blood were often seen about the genitals. When admitted the vagina was found to be full of vegetations. Some were soft and wart-like, others pedunculated and polypoid; from all of them a quantity of pus was secreted. The orifice of the urethra was choked up with similar vegetations, and when a catheter was introduced pus escaped through it before the urine flowed. The vagina was washed out constantly with astringent injections, and subsequently I removed the growths at several

sittings. The child who at the outset had very little appetite, gradually sank and died twenty-four days after admission.

At the post-mortem examination, growths, similar in nature to those described above, were found in the lower part of the bladder, the portio vaginalis and the canal of the cervix uteri. In addition there was pus in the peritoneum and an abscess of considerable size in the left kidney. It could not be determined whether the condition had originated from gonorrheal infection.

Hæmatometra.

S. W—, æt. 27. Twelve months previously she had a child which was delivered with forceps. The lying-in was attended by serious illness lasting four weeks. The menses did not reappear as her health improved. For five months at stated times she had suffered from severe pain about the sacrum and in the uterus. For a few weeks immediately preceding admission, the pain in the lower part of the abdomen had been tolerably constant. The application of some leeches over the painful part gave no relief. The patient was a tolerably strong woman. The uterus was enlarged to the size of a large fist, and lay rather to the left of the middle line. On examining per vaginam no portio vaginalis uteri could be found. Its place was occupied by some tough cicatricial tissue having a small opening on the left side, from which some sanious pus escaped; a catheter passed into this, ran upwards towards the left for an inch and a half. The canal, which was possibly the remnant of a former abscess, terminated in a cæcal extremity. A fortnight after her admission, I made an incision, strictly in the middle line, into the cicatricial tissue, through which fluctuation was distinct. Some tarry blood escaped, which by moderate pressure on the uterus through the abdomen could be made to flow in large quantity. The operation seemed exceptionally successful. During the next two days the patient went on well, but on the fourth day she complained of severe pain suddenly occurring in the lower part of the abdomen. The pain increased and extended, and within five hours she had all the symptoms of "foudroyante" peritonitis. No remedies were of any avail, and she died the following day.

Post mortem.—Six ounces of ill-smelling, turbid, purulent fluid in the abdominal cavity. The intestines distended. The peritoneum covered with a viscid, sticky layer, which in the cavity of the pelvis was more fibrinous in character. Hæmatometra was found in accordance with the diagnosis; both Fallopian tubes were tortuous, with pouch-like dilatations, and full of tarry blood. In one of the pouches in the right Fallopian tube was a small opening, from which a little blood only escaped. Probably this part had been adherent to the intestines. The ostia abdominalia of both Fallopian tubes were closed; the uterine openings were so narrowed that the very finest sound could not be readily passed in.

The above case closely resembles one described by E. Rose in his work entitled "Die Operation der Hæmatometra," ('Monatschr. für Geburtskunde u. Frauenkrankh.,' Band 29 and 30).

Ovarian cyst.

E. K—, æt. 21, strong and healthy-looking, stated that three and a half years previously the lower part of her abdomen began to increase in size rapidly. The catamenia commenced when she was seventeen. Two years previously, her medical attendant had punctured the swelling, and let out twenty pints of fluid. Within twelve months the distension had returned to its former size, and the same amount of fluid was again evacuated Five months before admission, the swelling had been punctured a third time, and the usual amount of fluid withdrawn. When the patient was admitted, the abdomen was distended as in the last month of pregnancy. Fluctuation was everywhere distinct. I made a puncture in the left side, but drew off only two pints of brownish-red viscid fluid. Another puncture in the middle line allowed one pint only of fluid of the same nature to escape. It seemed scarcely conceivable that the tumour, which had formerly been a simple cyst, had now become multilocular. A few days later, thinking that the cyst-contents might be particularly thick, I punctured with a large trocar in the right side. Death followed in three days from peritonitis. Post mortem: the cyst was found to be united to the abdominal wall so firmly that it could not be separated without tearing the peritoneum; adhesions had taken place also to the intestines and omentum. The opening of the puncture gaped, and a large quantity of the cyst-contents were found in the abdominal cavity. The walls of the cyst were rigid, a quarter of an inch thick, and rough on the inner side. Deep down in the large sac was a firm tumour, containing numerous smaller cysts.

Large fibroma of the uterus, containing a central cyst.

B. K—, æt. 39, stated that when about eighteen she suffered from chlorosis. When twenty-eight years old she had a child. Seven years before admission she experienced a good deal of pain in the abdomen, and a prolapse of the vagina and uterus formed, which, however, gradually disappeared without any special treatment. Three years later, she noticed swelling of the abdomen, and deep down in it, a spherical, hard tumour. This constantly increased up to the time of her admission. During all this time the menses had been very abundant, lasting from ten to fourteen days, so that at times there was no interval between the periods. This had much reduced her strength. The patient was of a weakly frame. The abdomen was distended as in the eighth month of pregnancy. The tumour fluctuated distinctly, but the history, and the fact that the cavity of the uterus measured seven inches, showed that the case was one of uterine tumour. I punctured the swelling and let out two quarts of clear serum. The tumour collapsed to some extent after this proceeding. No reaction followed. As extirpations in such cases are usually unfavourable, I did not advise operation.

The following case may be given rather more fully.

Ovarian tumour (?) *treated by puncture and injection of iodine.*

Marie K—, æt. 18, had noticed for four years the development of an abdominal tumour, which had occasioned her no pain. The menses commenced when she was 17 and were regular. She could assign no cause for the origin of the disease. A year previously the tumour had disappeared of itself in the course of two days, and at this time the patient stated that she passed enormous quantities of urine (rupture of the cyst into the bladder). Gradually the swelling returned. Six months before admission a large quantity of clear, watery fluid was evacuated by puncture. When admitted the abdomen was distended as in the eighth month of pregnancy, and all the symptoms pointed to a unilocular ovarian cyst. The tumour was punctured a few days after admission, and a large quantity of perfectly watery fluid escaped. A mixture of tincture of iodine and water āā 1½ oz. was injected and left in the cyst. The patient had rather severe pain for a few hours after the operation. On the following day the abdomen was tender on pressure; the urine contained some blood. In both urine and saliva a large amount of iodine was found. The fever diminished gradually and subsided altogether on the fourth day; there was then still a considerable quantity of iodine in the urine. After about a week the fluid began to collect again to some extent in the sac. She was then discharged at her own request. The evacuated fluid was analysed, in the chemico-pathological laboratory of the hospital, and the report was as follows :—" Pale, opalescent fluid, sp. gr. 1009, alkaline; 100 parts of the fluid contained 98·90 of water, 1·10 of solid residue.

(1) Organic substances 0·30. Small quantities of serum albumin, traces of fat, and free fatty acids. No sugar.

(2) Inorganic materials 0·80. Traces of sulphuric and phosphoric acid, and a considerable amount of carbonic and hydrochloric acid. Some calcium, sodium, potash, and traces of magnesia.

The possibility that the case was one of hydatid cyst cannot be denied. Neither from the history of the case, nor from the analysis, could an absolute diagnosis be arrived at.

I heard of this patient nine years after the operation. No trace of the tumour could then be felt. She had married, and had borne two children.

Recurrence would hardly be expected in such a case as this, but yet it would be desirable to have information, some years after the operation, in other similar cases. Not long ago a patient came to me, in whom one of my colleagues had, two years previously, treated a unilocular cyst by iodine injection. Whether the cyst shrank up completely at the time I cannot say, but when I saw the patient, there was an ovarian tumour about the size of a hen's egg. I did not advise, in this instance, any immediate operation. It is of

course very hard to decide in such cases whether the tumour be due to the refilling of the former cyst, or whether it is a fresh growth. It might be asserted that my diagnosis in the case above quoted was possibly incorrect, and that the cyst had not originated in the ovary but in the broad ligament. I freely admit the possibility; my power of differential diagnosis does not reach so far.

Injection of iodine into ovarian cysts will always be a comparatively rare operation, for the treatment is only properly applicable to unilocular cysts, with serous contents. Such cysts—according to my experience—are very rarely met with. Excepting the case described above, I have only met with one other, where the method might have been adopted.

Ovariotomy. (W. B. 1876).

Between 1865 and 1880, I performed one hundred and forty ovariotomies, with the results shown in the following table:—

	Cases.	Recovered.	Died.
In Zürich, 1865 ...	1	1	0
In Vienna, 1868 ...	3	3	0
„ 1869 ...	2	0	2
„ 1871 ...	3	3	0
„ 1872 ...	6	4	2
„ 1873 ...	11	3	8
„ 1874 ...	12	5	7
„ 1875 ...	13	6	7
„ 1876 ...	25	20	5
„ 1877 ...	29	16	13
„ 1878 ...	31	20	11
„ Jan. and Feb., 1879...	4	2	2
	140	83	57

We often hear it urged in opposition to the constantly increasing number of ovariotomies, that many ovarian cysts get well by spontaneous intra-abdominal bursting, while others are cured by tapping; again, it is said that cysts, which are tapped every six or twelve months, may go on for years without any great detriment to the patient. I am far from doubting the occurrence of such cases, though in the first two classes mentioned we may reasonably doubt whether the

diagnosis was always correct. Of one thing, however, I am quite sure, viz. that fortunate cases of this description are rare indeed as compared with the frequency of ovarian cysts. Simple cysts, independent of any colloid tumours, are in themselves not of common occurrence; the number of cases too, where nothing can be drawn off by tapping, and where, to all appearance, firm, or solid tumours exist, is, according to my experience, just as large as the number of cysts that admit of tapping. These firm tumours may either consist of numerous small colloid growths, with tense walls, or may be sarcomata, or dermoid cysts. The number of ovarian cysts met with is quite astonishing to me, and when I reflect that during the last five years my colleagues v. Dumreicher, Dittel, Salzer, Weinlechner, Kumar, Mosetig v. Moorhof, v. Rokitansky, and others, have performed ovariotomy more and more frequently, it almost seems as if more and more ovarian tumours actually arose for the operation.

Ovariotomy is one of the few operations about which I received no instruction from my teachers; I have only seen the operation performed once, by any one but myself, viz., by Spencer Wells, in the year 1865, at Zürich; and in that case I saw nothing of the after treatment. This case I took as my model, and Spencer Wells's remarks on the most important points connected with the operation, I adopted as the fundamental principles for my own guidance, when I began to operate. My first case at Zürich, and the first few in Vienna, did remarkably well; then came unsuccessful cases. I followed the recommendations of other operators, and for a time, improvement followed; notably in some of the very worst cases, I succeeded beyond expectation. At that time I used to operate on almost every case, on the principle *anceps remedium melius quam nullum*. As a consequence my experience widened, but in many cases the results were discouraging. Long before this I had felt that ovariotomy as an operation was more than justified. I became ambitious to extend the operation of laparotomy as far as possible to cases deemed hopeless, and no complication deterred me. Utilising all the recommendations of my colleagues, and often varying my method in details, I have extirpated carcinomatous tumours, sarcomata, omental tumours, the kidney, spleen, etc. This practice had its good as well as its bad consequences. The good results were, that I was able to save the lives of a number of women on whom many of my colleagues would hardly have thought

of operating; gradually also, as I became practised in the details of the operation, I acquired a calmness when confronted with difficulties, which has been of great advantage to my later patients. On the other hand, I lost many of these bad cases, and, becoming sceptical as to the value now of this now of that point of detail, on the vital importance of which stress had been laid, I was constantly wavering between one method and another. I may say that it was not till I had performed the operation nearly a hundred times that I was led to the conviction, that in few other operations does so much depend on the operator's individual experience, seeing that the number of complications is so multitudinous.

After a series of severe cases, which progressed favourably I hardly selected my cases any longer; still, I declined to operate on solid sarcomatous or cancerous tumours with extensive connections to the pelvis. In two such cases in which I operated, recurrence quickly followed, and the patients only survived for a few months. Irregular nodulated cancerous growths associated with much ascites, at times appear to be very moveable, but they are usually united to the omentum and small intestine by adhesions. Not only is the actual operation on such cases very dangerous (five patients on whom I operated all died of peritonitis), but so many nodules will often be found on the intestines, and on the inner surface of the abdominal walls, that we are hardly justified in attempting removal. Even if the operation be successful, there is but little prospect of prolonging life.

Tabes dorsalis when associated with ovarian cysts is a dangerous complication. One case of this nature died of gangrenous bedsores. Of two patients who suffered from Bright's disease at the time of operation one recovered and one died three years later of general dropsy. Pleuritic effusion, which not uncommonly exists in connection with large ovarian tumours, does not contraindicate operation; the effusion seems sometimes to be caused by the pressure of the tumour, and is rapidly absorbed after operation. Chronic bronchial catarrh is a fatal complication, since the cough may lead to abdominal pain and secondary hæmorrhage from vessels in the adhesions which did not bleed at the time of operation. I have hitherto met with no cases where ovarian cysts were associated with tubercular disease of the lungs. When symptoms of suppuration in the cyst occur, the surgeon is placed in a serious dilemma. Such an untoward occurrence when arising spontaneously is met with

most frequently in dermoid cysts, but may take place also in colloid growths, as the result, perhaps, of twisting of the pedicle. The same result may follow frequently repeated puncture, tapping, or draining. Those who look only to good statistical results, might leave such patients to die without operating; yet ovariotomy (perhaps sometimes free incision) is the sole means by which these lives can be saved. Out of three such cases I was successful in one instance. The operation was followed by numerous abscesses and convalescence was very tedious. The cysts will usually be almost universally adherent; at times, too, foul pus will be found in the meshes of the loose adhesions, so that matters can hardly be expected to progress smoothly.

The temperature of the operating-room was always kept at about 80° Fahr. This is a point of importance for cases in which numerous adhesions or free hæmorrhage prolong the operation, and where there is fear of anæmia and collapse.

It was formerly thought of great importance to make the incision as small as possible. True, it is always desirable, if possible, to draw out the entire cyst and its pedicle through an incision some three inches in length, but this very rarely happens. I find that an incision extending perhaps a couple of inches above the umbilicus, does not in itself materially increase the risk, and it may be of the greatest importance with regard to the further steps of the operation.

Undoubtedly, if a large incision be made, skilful assistance is necessary to prevent the prolapse of the intestines. These should be kept back by gentle pressure with large sponges. Formerly, when I thought it of importance to make the incision as small as possible, I was accustomed to introduce my hand and separate the adhesions as far as possible, before puncturing the cyst, so that the vessels in the torn adhesions might contract with the abdominal walls after the evacuation of the cyst. In most of the cases this plan succeeded very well, but at times, a large amount of blood escaped into the abdominal cavity, and it then became very difficult to find the bleeding spots and to ligature them through the small opening.

The development of large colloid tumours or cystomata massed together may entail most serious difficulties; sometimes puncture at numerous points is of service, but if nothing flows out through the cannula, either the incision must be extended far above the umbilicus,

or else a bold plunge must be made into the tumour, the septa of the colloid cysts torn through, and the contents scooped out. This answers well enough when the septa are thin and not too numerous. If they are tough and vascular severe hæmorrhage may come from the deep parts. The tumour may be adherent, and it may not be possible to expose it and the pedicle rapidly. Under such conditions, the situation is grave; the patients may lose much blood and the operator be in a serious perplexity. If I were to find myself in this dilemma, I should prefer to extend the incision, and draw out the tumour deliberately, leaving my assistants to press back the intestines by means of broad sponges. As soon as the tumour is exposed down to the pedicle, an assistant should hook up the upper end of the wound with his forefinger, and press together the abdominal walls with the other hand. This is the best way of preventing prolapse of the intestines.

Another condition may be met with which may embarrass the most skilful operator, though careful examination will not usually fail to detect it beforehand. I mean when the tumour (simple cysts I have rarely met with) cannot be lifted up out of the true pelvis, but has to be detached. In such cases a portion of the tumour is usually enclosed between the folds of the broad ligament as if it were in a hernial sac. If this portion of the tumour is firmly adherent, the uterus may be so pushed up as to lie in front of the ovarian tumour.

In one such case where I operated, the uterus, which was pressed out flat and studded with small fibromata, lay so high that on opening the abdomen for a moment I thought my diagnosis was wrong, and that the case was one of cystoma of the uterus. Under such circumstances it is necessary quickly to discover the neck of the sac, where the lower portion of the tumour is invaginated into the ligament, and the tumour must then be carefully separated by the hand. Tolerably severe parenchymatous hæmorrhage may occur, and long-continued pressure with sponges be found necessary. A pedicle proper can scarcely exist in such cases. The vessels, which are often large and resemble cord-like adhesions, should be ligatured before they are cut through.

Another complication that I have always found dangerous, consists in adhesions to the uterus or bladder; in separating them great care is required. The only method of controlling the hæmorrhage is to apply pressure. In two cases of this description, urine escaped through the wound four or five days after the operation,

the vesical fistula healed up spontaneously in the course of a few weeks. In another case vesical catarrh and pain persisted for a long time.

I have frequently found it necessary to ligature short adhesions close to the intestine. I have twice seen fæcal fistula form a week after operation, but in both instances the opening healed spontaneously in a few weeks.

On three occasions I met with cystic papilloma; in all there was much ascites; the greater part of the growth had to be scooped out with the hands. What astonished me was, that two of the patients recovered and only one died of peritonitis. One of the successful cases I heard of six months after the operation, and she was then well. The other was a woman some fifty years of age, who was reduced to a skeleton and could scarcely breathe by reason of her ascites. Both ovaries were found degenerated into cystic papilloma.[1] I did not feel certain at the time that all the diseased tissue was removed; however the patient recovered, and when I saw her two years later she had become stout and was in capital health. There was no trace of recurrence.

Before passing on to the treatment of the pedicle, I must say a word about the material employed for ligature. For some years I used hemp, and when the adhesions were very thick I doubled or trebled the threads, or substituted strong silk. I found it very difficult to acquire familiarity with the use of the catgut ligature. I had been always accustomed when using hemp or silk to tie the knots with the full strength of my hands, and thus, when I came to use catgut I always broke it. Even when by practice I could apply the ligatures properly, I found that the threads often became detached by the sponging or by slight manipulation. I became suspicious, too, of the material; the carbolic oil in which it was always kept till use was, as a rule, so rancid, that I could not believe that it had any particularly antiseptic properties. I therefore put this material on one side and adopted silk again, taking care always to soak the threads for half an hour in 5 per cent. carbolic acid solution.

For a time I employed Paquelin's cautery in the case of small adhesions, but found no particular advantage from its use.

[1] The "cauliflower" growth of Dr. Wilson Fox. See 'Med.-Chir. Trans.,' vol. xlvii, p. 246. A *résumé* of Dr. Fox's views will be found in Spencer Wells's 'Diseases of the Ovaries,' pp. 45 *et seq.*—[Ed.]

Ever since ovariotomy was first introduced, the greatest importance has been attached to the treatment of the pedicle. I have employed only two methods, either using Wells's clamp or allowing the pedicle to sink back into the abdomen after it had been ligatured with silk, hemp, or catgut. After numerous trials I came back to Spencer Wells's plan of applying a clamp whenever it was possible, and bringing the stump up externally.[1] No doubt the other method has the apparent advantage that the operation is completed at once, but I did not find that convalescence was more rapid from its adoption, and I fail, therefore, to perceive its advantage. It is more convenient to apply a clamp than numerous ligatures; again it seems more reasonable to allow the sloughing layer of cellular tissue to separate externally than trust to its becoming encapsuled in the abdomen. On the other hand, we cannot deny that the stretching of the pedicle occasionally leads to mischief. It is dangerous to judge of these questions from mere figures, when we bear in mind the numerous other complications of the operation, but we have no means, other than statistics, of settling particular points of importance. I find that of 34 patients in whom I employed the clamp 11 died; of 42 where the pedicle was returned 21 died. Acting on the advice of others, in 27 successive cases I returned the pedicle, but of these 15 died. This discouraged me considerably, the more that I did not meet with any better success when I employed catgut ligature and operated under the spray.

This leads me to say a word or two on the use of the spray in ovariotomy. My first three operations did well; then came a very simple case in which the adhesions were few and slight, but which was followed by severe carbolism.[2]

One of my colleagues met with a similar misfortune with one of his patients. Death in this case occurred in the second week. In all these cases the hand spray had been employed with 2 per cent. solution of carbolic acid. I was so alarmed at the untoward results that, for a time, I gave up its use while operating, and merely allowed the spray to work in the room some little time before operation. This was in 1874. In 1877 I again resorted to

[1] I am informed that Messrs Spencer Wells and Knowsley Thornton now (1881) make it their practice to ligature the pedicle with silk and return it. They find that (under antiseptics) convalescence is considerably hastened when the ligature is used. See note at end of chapter.—[Ed.]

[2] Supra, p. 15.

the antiseptic method, this time employing the steam spray with a 1 per cent. solution. I had no further deaths from carbolism, but even in simple cases, where I returned the pedicle, the results were so unsuccessful that I again abandoned this method. It is difficult when the spray has been employed, and vomiting and collapse follow, to tell whether the symptoms should be ascribed to the chloroform, the carbolic acid, or to septic peritonitis. Apart from this, even among some of my successful cases, the suppuration was so extensive and severe that I was kept in a constant state of anxiety. In my earlier experience I had never seen suppuration prove fatal at the end of the second week and later. At the time that I am speaking of, I saw it happen in the fourth week after the clamp had separated, and the wound healed. In some cases I made incisions in the abdominal walls wherever dulness led me to expect suppuration, and in this way was able, though with great difficulty, to save a few of the patients. I can see no harm in using the spray during the dressing of the wound; I can hardly say whether the spray is really necessary if great attention be paid to cleanliness.

On three occasions I performed ovariotomy under the thymol spray (1·1000) having seen good results in other operations. Two of the patients died of septic peritonitis; one recovered, but her life was endangered by numerous abscesses; one large abscess extended back up as far as the kidney, and was opened in that region.

I have now therefore, entirely discarded the spray in ovariotomy while the abdominal cavity is open; it will require a strong inducement to persuade me to revert to its use.[1]

With regard to the drainage of the wound, I usually employ the ordinary india-rubber drainage tubes. Primary drainage appears to me unnecessary, if there is no ascitic fluid, and when no adhesions from which hæmorrhage might be expected have been torn through. Out of fifty-one successive cases, I met with but one in which these conditions existed. Comparing the statistics of cases where drainage was employed with those in which it was not, I find a slight difference only in favour of the former method, but I can recall many severe cases in which, in my opinion, the drainage was the means of saving

[1] The above remarks refer to his practice up to the year 1877. In the early part of 1879 the translator had the pleasure of seeing Prof. Billroth perform ovariotomy under the constant use of the thymol spray. See note at end of this chapter.—[Ed.]

the patient's life. I must add, that it was a long time before I learned to employ free drainage, and could bring myself without hesitation, to insert six or eight drainage tubes in a single case. Ten years ago a surgeon would have been thought crazy for stuffing so much india-rubber into the abdomen. The first case in which I employed drainage through the vagina I shall not readily forget for it gave me very great anxiety. I had unluckily wounded one of the large vessels with my trocar. The hæmorrhage was controlled, for a time, by pressure with sponges, but it recurred, and I was compelled the next day to reopen the wound, and clear out the cavity of the pelvis, which was full of blood-clot. The patient was fortunate enough to recover—a result which is not too common under such circumstances. It will be readily understood that after this I preferred to introduce the drainage-tubes only into the wound. Some two years after the above case, I again tried drainage through the vagina, at a time when I attributed much importance to washing out the lower part of the peritoneal cavity with carbolic acid. I inserted two drainage-tubes through Douglas's fold, but the injection did not return, although the tubes were not choked. The carbolic acid solution (5 per cent.) remained in the abdominal cavity, with the result that the patients who, it must be allowed, were already in a septic condition, were seized with rapid collapse. The wounds were opened and the pelvis sponged out, but without avail. I next adopted a long drainage tube, which was brought out above at the symphysis, and below through the vagina, so that the tube could be drawn backwards and forwards, and the openings readily cleared of clots. This method of drainage also I gave up, for I found that constant syringing or even almost continual irrigation were powerless in one case to prevent encysted collections of septic sanious fluid from forming in other parts. I came to the conclusion that Douglas's space could only be perfectly drained by keeping the patients constantly in a sitting position. This is not always possible; if the patients lie on their backs some fluid will always collect in the cavity of the sacrum, as I have proved by dissection, and this fluid will not escape through the vaginal drain, unless the opening be dilated. After this experience, I entirely abandoned vaginal drainage, a method with which others have been more fortunate. In the more simple cases I insert only one drainage tube and pass the end deeply into Douglas's pouch; if more be required, I put in two or three in the same place, and pass one down between the

uterus and the bladder. In the very worst cases, I often insert additional drainage tubes on both sides, deep into the renal regions. Post-mortem, we often find fluid at this part. I pass also tubes beneath the abdominal wall to any part where adhesions were met with, and where, therefore, much effusion may be expected. My impression is, that one cannot well insert too many drainage tubes, and further, that the non-insertion, at one necessary spot, of a single drainage tube may endanger the life of the patient.[1] I prevent the tubes from slipping back into the wound by securing them with safety-pins, which may either be attached to the dressings or left free.

In sewing up the abdominal wound I pass the sutures through the peritoneum, inserting also a few superficial sutures, in order to provide for more exact apposition.

On the cut surface of the pedicle I apply little bags of gypstheer which I think is better and safer than crystals of ferri perchlor. The application can be renewed the day after the operation, and permanently discontinued after the subsequent dressing.

Of late, I have avoided, as much as possible injecting anything through the drainage tubes; nor do I attempt to draw off the fluid and effusions, unless serious symptoms arise and no escape takes place through the tubes. In ordinary cases, the drains may be removed after two or three days, but no harm will arise if they are left longer. High temperatures for the first day or two are not altogether favourable, but yet, in the absence of other severe symptoms, need have no particular influence on the prognosis. It is of course most favourable, when we find the general condition good, the temperature low, the pulse moderate, the abdomen flaccid and free from pain, and when the patient has a sense of hunger. Still, all these favourable circumstances by no means exclude the possibility of severe secondary fever during the second week or later. This secondary fever is a sure sign of suppuration, the situation of which must be carefully searched for, especially when flatulent distension and vomiting supervene. The abscess should then, if possible, be opened, either externally or through the vagina, and a drainage tube immediately introduced. If, however, these symptoms do not make their appearance, we may wait quietly for the spontaneous escape of the pus. The abscess may

[1] Prof. Billroth has now (1881) entirely discarded drainage, and the above remarks have been inserted chiefly from their historical interest. See note at end of chapter.—[Ed.]

open through the wound, or it may break into the bladder, the large intestine, or the vagina. Cases which are thus left to themselves, as a rule do well, and the discharge of the pus is accompanied by a rapid decrease of the fever. Moreover, this may happen several times without harm. If distension, vomiting, restlessness, and rapid pulse supervene, there is but little hope for the patient, even though the temperature keeps low. The severest cases of septic peritonitis constantly run their course with a perfectly normal temperature. Here we are met by a problem which has not yet been solved. As a high temperature would naturally be expected, can it be counterbalanced by other conditions, such as impairment of the renal functions and uræmia, or is it that the bulk of the absorbed septic products at once produces the low temperature of collapse? It is not easy to believe that the quality of the septic products can vary so much as to cause high temperature in one case, while another can run its course not only without increase, but even with an active depression of the temperature. If in such cases the lower part of the abdominal wound is opened up, with the idea of letting out some sanious matter, little or nothing will be found. The severe symptoms above mentioned, are for the most part signs of diffused peritonitis, where all the intestines are covered by turbid, glutinous purulent effusion, which does not go on to the proper formation of fibrine.

Before I habitually employed primary drainage, I had often occasion to reopen the wound, in order to let out the effusions, and in this way I have certainly saved patients who, otherwise, must assuredly have died. I then inserted drainage tubes and injected into the cavity weak solutions of carbolic acid and glycerine; in doing this, it is often remarkably difficult to hit on the entrance into Douglas's pouch. When large quantities of sero-sanguineous septic fluid are encysted (which cases are usually characterised by high temperatures during the first few days) the fibrinous adhesions are sometimes so tough that one scarcely dares to employ the force requisite to separate them, for fear of tearing the intestine; moreover, the uterus may be displaced backwards, and be so fixed that it is with difficulty detached. Separating the adhesions in this manner is best done within the first forty-eight hours; on the third or fourth day it is of but little use, for the general septic infection has commonly, by that time, proceeded too far.

Vomiting during the first twenty-four hours is of slight import-

ance as regards prognosis; if it stops on the second day, or begins as it so often does after the first thirty-six hours, it is then always a sign of peritonitis. The explanation of vomiting in peritonitis is not very clear; my idea is, that it may in great measure be accounted for on mechanical grounds, and is especially caused by the intestines becoming fixed in an unnatural position through firm, fibrinous adhesions. Prolapse of the intestines, and much moving and pressing back of the same during the operation is very undesirable, for the intestines are thus brought into positions which hinder the peristaltic action. The formation of fibrine takes place so rapidly that in a long operation, the process can almost be seen; at any rate, the increasing adhesiveness of the intestinal surface is very noticeable. If a loop of intestine is too much handled or twisted about, it may readily become fixed in a position unfavourable to the passage of its gaseous contents. At times, too, effusions collect in the true pelvis and press on the rectum, or coils of intestine may become so adherent to the pelvis, that the peristaltic action becomes reversed. When colicky pains persist for weeks after the operation, they generally depend upon such abnormal fixation of some part of the intestines. By introducing a short tube into the rectum flatus will often escape, with great relief to the patient; large quantities of flatus too may be got rid of with the vomit. In troublesome vomiting I have often employed repeated small subcutaneous injections of morphia with great benefit. It may be taken as a good sign, when the vomiting is in this way checked for a few hours, but a bad symptom when it is of no avail. If there be no distension it is perfectly unnecessary to administer enemata. I have often seen everything go on perfectly well, although the bowels did not act till the second week after the operation. Diarrhœa sometimes, though rarely, occurs in septic peritonitis. If the distension be very distressing, I generally give an enema containing sixty grammes of infus. sennæ comp. with an equal bulk of warm water, and repeat it, if in two hours it has produced no effect. If the enema acts, the patient will be greatly relieved; if no effect is produced it is a very bad sign. If all has gone on well up to the third or fourth day, but then steadily increasing distension begins accompanied by stercoraceous vomiting, it is sure to be due to incarceration, generally the result of volvulus. In such cases, I have twice performed enterotomy, and opened an immensely distended, small intestine. One was a case of ovariotomy, the other

of extirpation of the uterus; the volvulus was found, but both patients died. Post-mortem, we discovered that the enterotomy was above the twisted portion of the gut in one case, and below it in the other.

With regard to the cause of death, I may say that I lost no case during the first twenty-four hours. Eight of my cases, however, died within forty-eight hours. I ascribe death in these cases to septic peritonitis, even if secondary hæmorrhage took place. English surgeons would have attributed the result to "shock." Eighteen patients died of peritonitis between the third and the seventh day, and the others from various causes.

Laparo-Hysterotomy. (W. B., 1876.)

Up to the end of 1876, I had performed laparo-hysterotomy in seven cases of uterine fibroma.[1] Remarks on the first three operations will be found in the 'Wien. Med. Woch.' for 1876, No. 1. I have there explained how I have modified my former method of operating. Cases occur, especially in young girls and women, in which the fibroma grows no slower than an ovarian tumour; the patients may become very helpless merely from the weight of the growth, but their life, supposing that no hæmorrhage occurs, is much less directly endangered. The sufferers often remain for many years fairly nourished, and up to a certain stage in the tumour, their pains do not increase markedly. These fibromata are new formations, of a more firm and solid tissue than most colloid tumours of the ovaries. The latter entail danger, not only from their enormous size, sometimes reaching that ordinarily attained by cysts, but especially from the breaking down and death of the tissue, and the softening. When such changes take place in these tumours, chemical products are generated, whose absorption renders the sufferer cachectic and much reduced. Until the size and the weight of an uterine fibroma of itself becomes fatal to the organism, the patients can very well go on for ten years or more, especially if the conditions of life are favourable, and they are not compelled to undertake any heavy work. In the case of such women, a rapidly fatal issue cannot be foretold with such positive certainty as in women

[1] Some further cases are recorded by Dr. J. Mikulicz in the 'Wien. Med. Woch.,' March, 1879.

who have large colloid ovarian tumours; operation therefore cannot be so urgently counselled. A second point of danger lies in the hæmorrhage; now this, as it seems to me, does not depend so materially on the mere size of the tumour, as on the thickness of the layers of the uterus between the fibroma and the mucous membrane. Fibromata, which lie close under the mucous membrane, lead to ulceration of this lining and consequent hæmorrhage; such hæmorrhage seldom comes directly from the fibroma, but since it proceeds from the mucous membrane of the uterus, appears often under the guise of protracted menorrhagia. There can be no doubt that women with hæmorrhage of this nature can be preserved for a long time in very tolerable condition, provided that they are able to rest and take proper precautions; ergotine injections too are especially serviceable in such cases, but apart from the patients to whom such a life would be intolerable, the complete arrest of the hæmorrhage becomes an absolute question of existence for women of the working class. Either they must spend the greater part of their life in the hospital, or, if they work, die from the hæmorrhage. Thus I find that two of the cases on whom I operated, had wandered from one department to another in the hospital for nearly two years. Directly they were discharged, and began to work again, hæmorrhage recurred, and the unfortunate women lost again in a few days all the strength which they had gained by months of residence in the hospital.

I admit theoretically, that in the rules we lay down with regard to the indication for operation, we ought to free ourselves as much as possible from social conditions. Practically, however, we are very often forced to yield to such influences. Failing health and inability to work, combined with want of means of existence drives every one to come to a decision; now this decision is in such cases materially influenced by the fact that it is not with this disease, as with cancer, where operation might be immediately fatal, and can only yield some prolongation of life; on the contrary, from the nature of uterine fibroma, there is a prospect that a successful operation will restore permanent good health, and that the strength which has been lost will be regained, without the dismal prospect in the back-ground of any recurrence of the disease. Up to the present time (1877) I have only operated on patients with fibromata whose existence had become insupportable, either from the immense size of the tumour, or from the hæmorrhage, and have for the most

part dissuaded those women who are able to rest and take care of themselves, from any operation, even though they most earnestly desired it.

My experience has convinced me that technical difficulties alone stand in the way of making these operations more extensively practised. Such difficulties it is fully in our power to overcome.

Of the laparo-hysterotomies which I performed up to 1876, two recovered; one of these is described by Dr. Wölfler in the 'Arch. f. Klin. Chirurg.,' Bd. xi.

In the first case (a girl, 19 years of age), the immense size of the tumour,—in the second, the uncontrollable hæmorrhage, decided me to operate.

Of the five fatal cases, two died of hæmorrhage: the first, two hours, the second, twenty-eight hours after the completion of the operation. One patient died on the third day of septic peritonitis, another on the sixth day from volvulus of the ileum; in this case, enterotomy was performed without success. A third died on the seventeenth day of pyæmia, with suppurating thrombosis of the pelvic veins, and emboli in the lungs.

Although my list of cases is far from numerous, and my experience consequently limited, still, I may be allowed to make some observations on certain points which seem to me to be worthy of remark. I take for granted that nobody would venture on these operations who had not already, from ovariotomy, obtained some experience of those principles whose observance is indispensable in laparotomy. A point that distinguishes these operations from ovariotomies at the outset is, that in large tumours, an extensive incision has to be made, often right up to the xiphoid appendix. When so large an opening is made into the abdominal cavity, great attention is necessary on the part of the assistants in order to prevent the escape of the intestines. I must, from my experience, protest against removing the tumour piecemeal (Péan's "morcellement") or attempting to remove small portions of the tumour by enucleation; such a method prolongs the operation very much, and can scarcely be performed without serious loss of blood. I consider the danger of a large incision *per se*, to be less than that of the so-called manipulation.

In these operations no adhesions should be torn; they should invariably be ligatured with a double thread or clamped peripherally and then tied on the proximal side. The hæmorrhage from the

torn surface of the layers of the uterus, covering a fibroma, is usually very severe, and will not readily cease spontaneously. Such rents can seldom be ligatured; it is not possible to say how long the operation may last, and the patients may lose much blood before the uterus can be encircled by a ligature. In one case, before I had learned this by experience, I proceeded to deal with some very extensive soft adhesions on the posterior surface just as I should have in an ovarian tumour, that is to say, I scooped the tumour out with my hand. The hæmorrhage was most formidable; in order at least to stop the bleeding from this huge tumour, I made two of my assistants lift it up, and then placed an écraseur chain round it below. This was done with the more rapidity inasmuch as the mesentery from which I had separated the tumour was also bleeding furiously. As I removed the tumour above the écraseur chain, I inadvertently cut off a portion of the bladder which was closely united to the fibroma at the upper part. Having controlled the hæmorrhage, a second écraseur chain was applied over the bladder close to the edge of the cut surface, and then the upper portion of the bladder was separated from the tumour. In doing this, troublesome hæmorrhage again occurred. The tumour was then removed at the level of the first écraseur chain. The patient left the operation table alive, but died two hours after. As in ovarian tumours, so also in fibroma of the uterus, broad adhesions in the true pelvis are most to be dreaded. Such a case occurred to me in 1877. The bleeding was almost beyond control, but still the patient survived it, though she died a day later of septic peritonitis. It is of paramount importance to exercise the greatest possible caution, therefore, in dealing with adhesions in these cases.

If the uterus together with the fibroma be free, I ligature the broad ligaments on either side with two strong threads, and if possible, do this in such a way that the ovaries and Fallopian tubes remain connected with the tumour. I use these ligatures double, and tie them with all my might, and then cut through between them; sometimes these are the only parts ligatured in the whole operation. The large vessels, which are secured in this way seem formidable, but rapidly collapse after the deligation. Now, the tumour, together with the uterus, being slightly raised by an assistant, and the upper part of the abdominal wound being firmly closed, how are we to proceed? I am, like Péan, in favour of

always placing a ligature round the uterus, close above the portio vaginalis, and then removing the mass of the tumour, together with its hypertrophied capsule of uterine tissue, close above the ligature. If no adhesions be met with, the operation can be performed as cleanly as in a simple ovariotomy, nor need a single drop of blood escape into the abdominal cavity. Now comes the question of how and with what we are to encircle the uterus below, and how we are to deal with the stump. These seem to me most important technical questions, on whose final decision the future fate of the operation will materially depend.

Hitherto I have abstained from allowing the stump to sink back into the peritoneal cavity. Under some conditions we might, perhaps, succeed in controlling the hæmorrhage by securing the numerous vessels, and the stump might then be dropped back without any danger of hæmorrhage following. One or more drainage tubes might be passed through the vagina, behind the cut surface, which ordinarily is turned upwards towards the promontory, so as to allow the secretions, which in all these cases are tolerably abundant, to drain off. Many things have hitherto prevented me from adopting this method, especially the thought of the danger that might arise from unchecked bleeding from the stump. One could hardly prevent this, without ligaturing the stump *en masse*, which in such a case could scarcely be done without causing sloughing, and possibly putrescence. Again, there is a source of danger in that, the vessels behind the uterus at the lower part might be so dilated that there would be a risk of puncturing them in passing the drainage tubes through the vagina. Finally, I must declare my preference for the extra-peritoneal treatment of the pedicle, a preference which I have derived from my ovariotomies. Although, therefore, I discountenance the other method, I would not deny its possible advantages. Péan's loop for encircling the uterus, I do not like; I could never succeed in obtaining any wire which did not break on being drawn tight and twisted. After many attempts to modify the apparatus, I discarded it altogether. I then employed a special kind of clamp, something like that used for the treatment of very thick pedicles in ovariotomy. This instrument, however, drew up the stump of the uterus so much, and pressed at the same time to such an extent on the abdominal walls, that I soon gave it up. I next had an écraseur made, with a particularly long and strong chain. The

fore part of the instrument was removable. As soon as the chain had been drawn sufficiently tight, it was fixed by means of a screw in the removable part, and it could then be left on after the manner of a clamp and the surface of the stump cauterised. A strong silk thread was then placed on the pedicle below the loop of the écraseur, so that the knot came on the right side. After the knot had been firmly secured on the pedicle, the two ends of the silk were threaded on a needle, which was then passed through the abdominal wall from within outwards, brought out an inch from the cut edge of the skin and there secured. A similar thread was secured on the left side in the same way. The threads being tied above the skin on both sides, the peritoneal surface of the wound in the abdominal wall lay in firm apposition with the stump: drainage tubes could then be placed between the uniting sutures, in the ordinary way, passing close up to the stump. By this method the portion of the stump, which has been encircled, is kept well out of the abdominal cavity, and if it sinks back, draws down also the part of the abdominal wall to which it has been apposed, so that the pedicle cannot be forcibly torn away. By the time that the chain of the écraseur comes away the threads also separate, and require merely to be cut through on the surface of the skin, in order to be withdrawn. Some inconvenience in dressing is occasioned by the rusting of the chain of the écraseur, which is allowed to remain and sinks back deeply, but this is of no moment. When I tried this method for the first time, I did not leave the chain *in sitû*, but I passed strong, double ligatures threaded on a very long straight needle through the pedicle. The latter was raised up vertically and the threads were passed horizontally, from before backwards, and were then knotted at the sides. After this had been done, the chain of the écraseur was released. In spite, however, of the firm way in which the pedicle was secured, bleeding occurred from it, necessitating the securing of several vessels.

In my next case I shall try this method again, but after each separate thread has been knotted at the side, I shall carry it once more round the whole pedicle, and draw on it firmly for some time before I tie the knot. The stump of the uterus is so elastic that it requires to be compressed for some time, in order that all serum may be squeezed out, before the knots are secured.

In applying the écraseur, great care must be taken; it must be drawn tight very slowly. After a few minutes the chain will be

found again quite loose, either because much of the serum has been pressed out of the stump, or because some fragments of the fibroma which may possibly lie in the stump are drawn forward to the cut surface. The chain must then be reapplied, but this should not be done with such force as to separate the peritoneal covering, or severe venous hæmorrhage might ensue, which it would be very troublesome to control. The safest plan would probably be to apply two écraseur chains one above the other, and then remove the lower one replacing it by a ligature. The ligatures would more easily be drawn sufficiently tight on the parts which had already been encircled, and then the upper chain might safely be removed. My only fear is, that by this method, the peritoneum might be torn in taking away the écraseur chain, and fatal hæmorrhage thus be caused. For the first trial of this method a case ought to be selected, in which, up to the point of applying the écraseur chain, there had been no hæmorrhage.

In a case which recovered after operation (in May, 1877), a fistula between the abdominal wall and the vagina persisted for a long time, and mucous discharge flowed through the lower end of the healed cicatrix from the short open canal of the cervix. The fistula in this instance was closed by the energetic application of caustics, but in two similar cases, closure only took place after a long period.

I am firmly convinced that when we have had wider experience of the practical details of the operation, and especially when we perform laparo-hysterotomy in cases where the tumours have not been allowed to attain such enormous dimensions, the danger of the operation will be reduced and the results, as in ovariotomy, cannot fail to be better and better.

Recent Modifications in Operating.[1]

(April, 1881.)

Formerly, for laparotomies, thymol spray was used, but this was discontinued early in 1880. Professor Billroth now habitually operates without the spray. His present views on the subject of the spray will be found expressed in a contribution to v. Langen-

[1] I am indebted to the kindness of Dr J. Mikulicz, assistant in Prof. Billroth's clinic, for the informanion here given.—[Ed.]

beck's 'Archives,' No. 25, by Dr. J. Mikulicz, entitled "Zur Sprayfrage." The temperature in the room is kept uniformly at 20° R. Great care is exercised with the sponges, and the utmost precautions are taken to ensure their proper cleanliness and asepticity. The separate sponges are kept at least a week in a 5 per cent. solution of carbolic acid. A little time before use they are removed from this and soaked in 1 per cent. solution. In ovariotomies intraperitoneal treatment of the pedicle is now invariably employed. For the pedicle and for large adhesions the following method is in use. A special clamp is applied firmly for about one minute, so as to press out all the fluids. The clamp itself somewhat resembles a pair of long sequestrum forceps, one only of the two surfaces which come into contact being serrated. By means of a catch at the extremity of the handle the surfaces can be pressed together as tightly as required. The clamp is then removed, and a silk ligature tied round the pedicle or the adhesion, in the groove made by the clamp; but little force is found necessary in tying the strings. For small adhesions Péan's pince hémostatique is used in the same way as the clamp, the ligature being subsequently applied. No peritoneal drainage is now employed. In uniting the abdominal wound button sutures like those employed by Professor Lister, are found very convenient.

With regard to the antiseptic modifications recently adopted see introduction. It need only be stated here that antiseptics are rigidly carried out, save that the spray is not used. It has not been found that its discontinuance has in any way interfered with the successful results of these operations.—[Ed.]

CHAPTER XV.

INJURIES AND DISEASES OF THE PELVIS AND LUMBAR REGIONS.

Case of gunshot wound. Case of diastasis of bones of pelvis. Fracture of pelvis—Case and remarks. Case of chronic pelvic abscess unconnected with bone. Ditto opening into gluteal artery—Remarks on pelvic abscess. Cases of retro-peritoneal abscess. Case of caries of pelvis with retention of urine. Chronic periostitis and caries of pelvis—Cases and remarks. Inflammation of inguinal lymphatic glands. Case of inguinal abscess bursting into the bladder. Case of cystic enchondroma. Case of large osteo-chondroma; removal, transfusion, death. Large enchondroma of the pelvis; removal, death on seventh day. Cases of pulsating sarcoma of pelvis. Sarcoma of the pelvic cavity pressing on the bladder; operation to relieve retention. Case of spindle-celled sarcoma of nates. Case of cancerous degeneration of a congenital coccygeal tumour.

Gunshot wound.

A Polish refugee was wounded in a duel with pistols, the ball entering close behind the right trochanter; no aperture of exit. On exploring the track of the bullet with a catheter, it was found to lead by a devious track to the right edge of the sacrum; the bullet itself could not be felt. At first all went on well, but at the end of three weeks a deep abscess formed close to the left side of the sacrum. An incision was made, and a piece of cloth—part of the man's trousers—extracted. A cavity could then be felt in the sacrum, but neither through the opening of the abscess, nor through the rectum, could the bullet be felt. Profuse suppuration ensued, rigors, and death in the sixth week. Post-mortem: the bullet was found in front of the os sacrum, and the bones in the neighbourhood were carious; no metastatic abscesses.

Diastasis of the bones of the pelvis.

A man, æt. 52, was struck down by a falling tree, and died a few hours after the injury. Post-mortem: The bones at the symphysis pubis and the right sacro-iliac joint were found to be widely separated. There was also a complicated fracture in the lower third of the right femur.

Fracture of the pelvis.

Among the cases of fractured pelvis may be mentioned that of a child, six years old, over whose pelvis an entire railway train passed, so that the lower part of the body remained attached only by the skin, which was but slightly lacerated. No hæmorrhage from the large vessels. The child died an hour after the injury.

The diagnosis of fractured pelvis is, in many cases, easy enough. By forcible rocking of the pelvis, pressure on the symphysis, or exploration by the rectum, the fracture may, in the majority of instances, be recognised through the severe pain and the perceptible displacement of the bones. No doubt fissures of the venter ilii, and of the acetabulum, cannot be always positively diagnosed, but when, after some considerable injury about the pelvic region—where fracture or dislocation of the vertebral column, thigh, etc., can be excluded—the patient is only able to stand upright or walk with much difficulty, or where these symptoms disappear after some weeks' rest in bed, it may be pretty confidently assumed that fracture of the pelvis existed. In a very large number of cases which came under my observation, the patients were unable at first to pass the urine and required the use of the catheter. It must not be supposed, from the presence of this symptom, that any lesion of the bladder necessarily exists, or that the spinal cord has been injured, as such symptoms frequently disappear after a few days or weeks; it is possible that sometimes the jarring of the vesical nerves may account for the paralysis of the *detrusor urinæ;* but I suspect that in many cases the functions of the muscular coats of the bladder are paralysed for a time by the extravasated blood, which so frequently, in fractured pelvis, almost entirely surrounds the organ. Usually in simple fracture of the pelvis, the extravasation is soon absorbed, and the functions of the bladder are thereupon restored. In other cases, I believe par-

tial suppuration takes place, and gives rise to the rigors, which I have frequently observed in cases of fractured pelvis, where recovery followed without any serious results. When there is a wound of the skin and injury to the urethra, the breaking down and suppuration of the extravasated blood which usually ensues will inevitably prove fatal; even if no external wound be present, the suppuration may lead to thrombosis, metastatic abscesses in the lungs, and pyæmia, as some of my cases prove.

Chronic abscess of the back of the pelvis, unconnected with bone.

Louise W—, æt. 26, married, mother of two children, stated that she had suffered, up to the age of 20, from chronic abscesses in the cervical glands, and also about the elbow and trochanter. About a year and a half before her admission she had severe pain in the right gluteal region, extending down into the lower limbs. Six weeks before we saw her an abscess had been opened in the gluteal region, and a great quantity of pus let out. Although the cavity of the abscess was most minutely examined, no bone could be detected, and it appeared to be confined to the cellular tissue. The sinuses would not heal, and a year later the patient's chance of recovery seemed hopeless.

A. L—, æt. 20, a weaver, had suffered, fifteen months before his admission into the hospital, from pain in the right gluteal region; he found gradually increasing trouble in getting about. An abscess formed behind the right trochanter, which enlarged steadily, and about a year after the commencement of the disease, opened spontaneously at several points. The patient, who up to that time had been able, though with some difficulty, to get about, was now confined to bed; the suppuration was very considerable. Injections and baths were employed, but the sinuses could not be induced to close. One day, without any apparent cause, sudden hæmorrhage took place from one of the sinuses; it was controlled by a tampon, but soon after occurred again, and he was brought up to the hospital. Shortly after his admission fresh arterial bleeding took place. I laid the sinuses open down deeply into the gluteal muscle and secured the gluteal artery from which the hæmorrhage came. There was no further return of the bleeding; the large wounds of incision healed up slowly and the patient gradually recovered, but in spite of careful treatment the sinuses were still discharging, four and a half years after the commencement of the disease. The man was sent home so pale and wasted, and was altogether in so miserable a condition, that he could not be expected to live long. I could not make out that there was any disease of the internal organs; no exposed bone could be felt through any of the numerous sinuses.

Pelvic Abscess without any apparent Disease of the Vertebral Column or Bones of the Pelvis.[1]

Altogether I have seen twenty cases of this description—fourteen of which occurred in men and six in women; in three of the latter the abscesses were of puerperal origin; in the remaining seventeen no origin could be assigned for the disease. They commonly occurred in individuals between twenty and forty years of age. They nearly all answered to the so-called psoas abscesses, with the characteristic flexion of the leg. In three of the patients absorption took place and recovery followed. In two cases the action of the contracted limb was completely restored; in one the contraction was permanent; in those in which the abscesses opened, this took place close above or below Poupart's ligament. Seven of these patients died from the suppuration—partly with symptoms of pyæmia, and partly from the exhaustion. In one instance the abscess broke into the urinary bladder, and in another a fistula formed between the intestine and the abdominal wall. One patient with a large, congestive abscess, which broke into the intestine, recovered completely in a few weeks.

Retro-peritoneal abscess. (*Acute psoitis.*)

In the case of a young lady whom I saw in private, a large abscess had formed and occasioned terrible pain; the patient did not remain under my treatment, but I heard subsequently that the abscess did not break, but became absorbed. However, a great deal of contraction was left. The disease lasted seven months.

In another case, that of a man about 40, an acute abscess formed deep down in the right side of the pelvis. After a month it broke spontaneously, close under Poupart's ligament. In course of time the discharge of pus ceased, and the opening closed up; convalescence, however, did not set in, and the patient had constant pain about the right kidney. Under these circumstances, and on account of his great suffering, and very severe intermittent febrile attacks, he was brought over from Belgrade to Vienna to see me. I found him in a deplorably reduced condition, and unable to extend his left leg completely. I detected fluctuation deep down in the region of the right kidney, and on making an incision let out a large

[1] See, also, *supra*, p. 229, for further remarks on abscesses of this nature.

quantity of thick pus. Convalescence was very slow, but eventually it was complete, and the contraction of the leg disappeared; the patient—who was at one time emaciated to skin and bone, with flushed, hectic cheeks, hollow voice, and looking as if he had only a few days to live—is now one of the finest and strongest officers in the army.

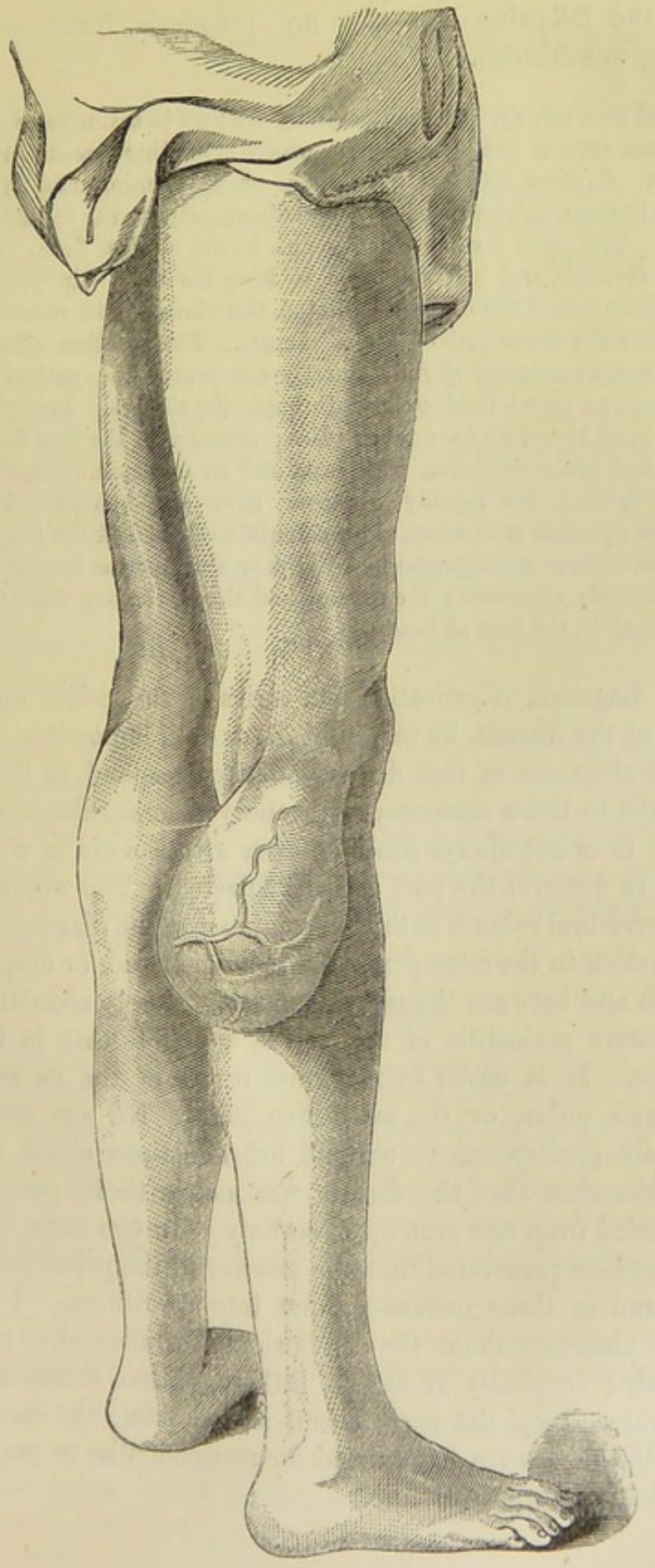
Chronic periostitis and caries of the pelvis, with retention of urine.

A peasant, æt. 18, suffered from a large abscess on the left side of the os sacrum; this was accompanied by retention of the urine requiring the daily use of the catheter. After three weeks the abscess, which had reached the size of the fist, was opened; the edges of the sciatic notch, and the inner surface of the sacrum, were felt exposed and roughened. After the opening of the abscess the patient recovered the power of micturition, and the cavity completely closed up in about four months.

J. S—, æt. 24, a baker, was admitted into the hospital for a pain in the sacral region, from which he had suffered for some time, and the nature of which could not be positively ascertained. After resting for a time the patient was again able to get about his business, but the pains had not entirely deserted him. Two of his brothers and a sister had been affected with glandular abscesses and caries. Some affection of the vertebral column was suspected. Two years before his admission, as he was lifting a heavy weight, he felt an intense pain behind the right trochanter, "as if something had given way;" shortly after this the right lower limb began to swell and became painful. After a few weeks' rest in bed the diffused swelling and the pain subsided, but a circumscribed, soft, painless tumour was observed at the upper part of the thigh. The patient went back to his work, and in the course of the next two years the tumour gradually sank lower and lower on the back of the thigh. When admitted we found a sac full of fluid, almost the size of a man's head, in the right ham. By exercising pressure on it a wave could be felt, conducted along a canal of about the dimensions of the thumb, leading right up to the tuberosity of the ischium. (See Fig. 17.)

The swelling gave the patient no real trouble, but he wished to get rid of it, as he intended to marry. I came to the conclusion that the swelling was due to a very large congestive abscess, which had commenced in the pelvis. I acceded to the patient's wish, and let out an immense quantity of thin pus by means of a trocar, taking care not to admit the air. At first all went on well, but then, probably from the patient's disobeying the injunctions to keep quiet, severe inflammation ensued; the suppurating track had to be laid open in several places and drainage tubes inserted. The patient's condition became highly febrile, rigors ensued, and the amount of suppuration was prodigious. I gave him up as beyond recovery, and allowed him, at his own desire, to be removed home. A year later I heard that he had completely recovered health and strength, and was pursuing his avocation.

Fig. 17.—Abscess, connected with the Ischium, presenting in the Popliteal Space.



In the following case also my prognosis, fortunately for the patient, was falsified.

Alfred S—, æt. 13, had been perfectly well up to seven years of age, then an abscess formed over the sacrum, which after three weeks broke spontaneously. A sinus was left at the site of the opening, and fresh abscesses formed in the neighbourhood, leading subsequently to the formation of other sinuses. The child became pale, though he did not lose flesh. He was but seldom feverish, and had not often to keep his bed. Six years after the commencement of the disease I dilated the sinuses, and removed a sequestrum from the lower part of the os sacrum. The reaction after the operation was comparatively slight. Shortly afterwards the patient had slight diarrhœa, and fæcal fluid escaped through the sinuses. Perforation of the rectum must therefore have taken place; anasarca of the legs followed, then ascites and great weakness, with casts and an immense amount of albumin in the urine. No remedy whatever gave any benefit. The debility increased so much that when, at his parents' wish, he left the hospital, I gave the most unfavourable prognosis. Eight or nine months later the child came back perfectly recovered; the sinuses had closed, the boy was strong, stout, and seemed in the best of health.

The diagnosis of periostitis and caries of the pelvis may, at the outset of the disease, be very difficult, or even impossible. The congestive abscesses in this disease often correspond in the direction they take to those connected with the vertebral column or the hip-joint. It is not always possible, even with the aid of a catheter or probe, to discover the part actually affected. The absence of pain in the vertebral column or the hip-joint assists the diagnosis; chronic suppuration in the retro-peritoneal cellular tissue, or deeply situated beneath and between the gluteal muscles, closely simulates chronic suppurative periostitis of the pelvis, and not least in its tedious progress. It is easier to recognise caries of the os sacrum, the symphysis pubis, or the sacro-iliac joint. No age seems to be especially predisposed to chronic inflammations about the pelvis. My tables shew that the disease was met with in patients whose ages varied from one year up to seventy. In two cases the congestive abscesses penetrated from the interior of the pelvis into the hip-joint, and in three instances burst into the rectum. I think that chronic abscesses about the pelvis should be allowed to open spontaneously; surgically we can do little more than occasionally dilate the sinuses, keep the parts clean, and promote the free escape of pus. If the disease has existed for many months or years there is scarcely any prospect of cure.

Inflammation of the Inguinal Lymphatic Glands. (W. B.)

In one case where there was an immense bunch of hypertrophied glands, in which partial suppuration had taken place, I extirpated the mass; the operation was followed by recovery.

Eight cases of acute and subacute enlargement of the lymphatic glands came under treatment, for which no peripheral cause of origin could be discovered. If the existence of pus could not be made out, attempts were always made to procure resolution by means of compression with shot-bags. I have succeeded in completely curing a few cases in private practice by this means, and the infiltrated glands often disappear with remarkable rapidity. Single glands, however, in which probably pus had already formed, ran on to suppuration. The treatment by compression was continued after the opening of the abscesses, which closed up with remarkable rapidity.

The following case, where a deeply-seated inguinal abscess burst into the bladder, is of some interest.

The patient, a man, æt. 32, had noticed nine months before his admission an inguinal swelling on the right side. An abscess formed in this spot, which was opened, and soon healed up. Two months later a fresh abscess formed, close to the cicatrix of the former one. After a fortnight it broke spontaneously, and urine was discharged, together with pus, from the opening. A very small urinary fistula was left which closed up completely and permanently after cauterisation.

Cystic enchondroma.

I was consulted by a gentleman about 50 years of age, for a tumour of this nature in the sacro-iliac region. On puncturing the growth, which was about the size of a fœtal head, and in which fluctuation was very perceptible, a large quantity of brownish-red, viscid fluid escaped. Numerous sago-like bodies floated about in the fluid. On microscopical examination these proved to consist of hyaline cartilage. Of the further history of the patient, I know nothing. The tumour had originated thirteen years previously, after an injury.

Osteo-chondroma of the pelvis; removal, transfusion, death.[1]

From an operative point of view the following case is of great

[1] From the 'Wien. Med. Woch.,' Jan. 9, 1875, No. ii, p. 26, being an extract from a paper by Dr. Billroth entitled "Zur Bluttranfusion."

interest. With regard to the transfusion, it may be stated that the possibility of some previously existing infection could not be entirely excluded, although death undoubtedly was not due to the infection.

Theresa R—, a cook, æt. 29, was admitted for an enormous osteo-chondroma, which had originated in the left side of the pelvis and had been first noticed two years previously. When admitted we found a hard tumour, rather larger than a man's head, springing from the horizontal ramus on the left side. A similar hard growth so completely filled up the pelvis, that defæcation and micturition for a long time past had been materially interfered with. The patient had been confined to bed for many months for the left leg was forced into a position of permanent abduction, although the movements of the hip-joint were free. She suffered severe neuralgic pain in the left leg, especially along the course of the obturator nerve.

My first impression on examining the case was that nothing could be done for it. I would have sent the patient back to her own home that she might die quietly among her relations, but as from her condition she required constant catheterisation, subcutaneous injections, and so forth, which could only be properly administered in a hospital, I was precluded from so doing. Thus it came about that we saw her constantly growing worse, and we could not avoid the reflection that here was a person dying of a tumour, in itself of an innocent nature, which was attached to one portion of bone only, and whose removal was neither necessarily fatal, nor in all probability absolutely destructive to the functions of the parts. Reflections such as these we neither can nor ought to put on one side, for it is from the like that operations most rich in blessings have been devised, as also it must be admitted the most bitter feelings of resignation with regard to the limitation of our art.

From the experience derived from a former case,[1] I felt that the possibility of successfully removing the mass, with or without a portion of the pelvis, depended on whether the tumour had the same connections to the inner as it had to the outer surface of the pelvis. In the case cited below this was the condition, and the operation succeeded beyond all expectation, although the patient died on the seventh day of septic infection. But in this woman the condition of things was worse, the tumour was more extensive and the general condition less favourable. It

[1] Case of A. S—, described below, p. 331.

was not possible to define the connection of the tumour within the pelvis, and we could only make out that the ramus ascendens and the tuber ischii were free from the growth. The horizontal ramus was unaltered. The vagina, the uterus, the bladder, and the intestines lay on the right side of the pelvic cavity and were not completely compressed. Within the pelvis the tumour occupied the left side to an extent which it was impossible to determine, and this fact still rather deterred me from operating although I had pondered the matter well in all its details.

Again, the extent of the tumour was such that I seriously feared the hæmorrhage, although in the case already referred to the bleeding was not formidable; still I trusted that compression of the aorta, which at the time of writing had recently been employed with good success, might enable me to overcome the difficulty. In order to allow the secretions to escape readily, I determined to cut away a portion of the ascending ramus and to employ free drainage.

Ultimately, though with anxious misgivings, I decided to attempt the removal of the growth. I forbear to give in detail an account of the operation, for it would occupy too much space, and merely premise that my assistants as well as myself devoted to it the utmost possible care and attention, feeling that our object was to save the life of a fellow-creature who was in the utmost jeopardy. At first all went on well enough; the connection of the huge tumour to the outer side of the pelvis was much smaller than we expected; its diameter was not greater than the forearm of an adult. I resected the greater part of the horizontal ramus, hoping that when I had cut away also a portion of the ascending ramus, I should be able to turn out the tumour without any great difficulty, but on this occasion we found ourselves disappointed as to the connections of the tumour on the inner surface of the pelvis. The growth had no attachments to either of the portions of resected bone, but, as appeared on further examination, to the inner surface on the left side, and that too, by a very broad base of attachment. The space which I had gained by the resection enabled me to introduce my hand into the cavity of the pelvis, and to remove the tumour in layers. In this I at length succeeded, though it occupied an hour or more, and was attended by severe venous hæmorrhage from within the pelvis. From time to time the aortic tourniquet had to be relaxed.

My courage sank at the long duration of the operation and the gradual failure of my strength. At length the removal was completed. All the bleeding vessels were ligatured, and the entire wound firmly plugged with tampons, but in the meanwhile the patient, though she was only partially narcotised, had become very anæmic and collapsed. We administered some hot coffee and wine which she vomited up at once. While dressing the wound we had enveloped all the extremities with elastic bandages. Immediately

on the removal of the aortic compressor the patient was seized with deep syncope, complete loss of pulse, irregular respiration and total insensibility. Evidently after the removal of the compressor, the diminished quantity of blood proved unequal to the supply of a larger area, and the amount which reached the heart, brain, and lungs was insufficient to keep up the functions of those organs. Still the heart was working. It was of paramount importance to supply the brain with blood. Instead of the horizontal position adopted for those who have fainted, in view of the imminent risk we placed the head hanging deeply down. Some strong assistants supported the patient with her legs raised, and after some time the respirations became more regular, the widely dilated pupils contracted, and the blanched lips regained some colour. She vomited up some coffee and spoke a few words. The effect of the position of the head was extraordinary. I had really given up all hope. After she had been almost vertically suspended head downwards for three or four minutes, the colour of the lips became livid, and we thought that the action of the circulation would be sufficient to continue when she was laid horizontally, but complete collapse ensued after she had been a few minutes in this position. Vertical suspension was again resorted to, and again with success. Five separate times was this repeated. Fearing lest my assitants should become exhausted, I placed the patient on an inclined plane in such a way that it did not require so much exertion to support her head downwards.

At length it became evident, beyond a doubt, that the absolute quantity of the blood was insufficient to support life until new blood formed, for without causing artificial determination of the blood to the brain, the necessary physiological functions could not be kept up. What was there now left but to perform transfusion?

I dismissed my dislike of this operation, for I felt that now, if ever, the indications for transfusion were present. Herr Dr. Klotz, of the Tyrol, at once offered to give some of his blood for the patient. Everything was ready to hand, and I performed the transfusion at once. The venous blood filtered, stirred up, and warmed to 37° C. was injected into the brachial artery of the patient's left arm. The patient struggled so much while I sought for the vessel, that the arm had to be held by two assistants, and it was only after considerable search, and doubt as to whether I had exposed the artery or the vein, that I was able to insert the cannula and inject the blood in a peripheral direction. As I began the transfusion, and slowly injected about three ounces, the patient evidently experienced considerable pain, and called out "herr professor!" The arm was of an arterial red colour, and some of the subcutaneous veins were visible, when, in a moment, the respiration and beats of the heart ceased—life was suddenly extinguished.

I am far from thinking that this patient would have lived if transfusion had not been adopted, but any one who had been pre-

sent and seen the occurrence would have had the impression that in this case death was directly caused by the transfusion. The operation had lasted about two hours, and death took place one hour after its termination.

The post mortem did not reveal anything further at the seat of operation. With regard to the hanging down of the head, it is interesting to observe that the brain was not particularly anæmic. A point of interest also in connection with the transfusion was that the right side of the heart and the lungs contained a moderate amount of blood, while the left side of the heart was absolutely empty and moderately contracted. It seemed as if the organ had refused the blood which poured into it, and had suddenly become rigid. The organs of the abdominal cavity were all highly anæmic.

Panum says that in cases such as these the failure of transfusion and the beneficial effects which, on physiological grounds, might have been expected from it, must be attributed to the antecedent disturbance (erschütterung) of the nervous system by the operation and the loss of blood. Others are of opinion that the filling of the right side of the heart, which, relatively, always takes place too quickly, accounts for the sudden paralysis of the organ. My impression in the above case was that spasm of the heart had something to do with the matter, partly from the suddenness of death, and partly from the post-mortem appearances. Perhaps also the difference in temperature between the injected blood and the tissues of the exsanguine body, had some share in causing death.

But let all this be as it may, one fact is clear—that transfusion often fails just when, from all physiological reasonings, we should expect it to have a conspicuous effect.[1]

Enchondroma of the pelvis. Removal.

A. S—, æt. 34, consulted me in December, 1868, for a large enchondroma on the anterior part of the right side of the pelvis. It appeared that up to the commencement of 1865 he had always been healthy and strong, but that then he had frequent pains in the right hip, resembling lumbago. The pains soon became very severe, extending to below the knee, and were then

[1] Some further highly interesting remarks on the subject of transfusion (an operation not much in favour with Prof. Billroth) will be found in the 'Wien. Med. Woch.,' Nos. 1, 2 and 3, Jan. 1875. [Ed.]

supposed to be due to sciatica. Sitting down caused him great suffering. He was sent to Wiesbaden for the affection, which was supposed to be of a rheumatic nature. At the end of 1865, he first noticed a hard tumour on the right side of the perineum. For some time the suffering varied much in degree, and he was not compelled to absent himself from his military duties. He then consulted Professor Roser, who discovered a pelvic tumour, and on the supposition that it might be a syphilitic exostosis, treated him with iodine, but without any benefit. Subsequently other antisyphilitic treatment was employed with equal want of success.

In November, 1868, the pain from the tumour increased to such an extent, that frequent subcutaneous injections were necessary, and the patient was forced to keep to his bed. There was great difficulty in defæcation; enemata could hardly be given, and purgatives caused very great distress; in fact, his condition was such that we agreed he could not last many months. He was fully aware that his case was hopeless, but was very resigned, and more than hinted his determination to commit suicide, if his sufferings became unbearable. He asked me whether operation was absolutely out of the question. I told him that it was not possible to speak from experience on the matter, but that, acting on certain suppositions—the accuracy of which could not be predetermined—it would be possible to remove the tumour without any direct danger to life; further, that though, of course, recovery was problematical, his power of walking might be restored.

The patient caught eagerly at this last ray of hope. I warned him that I would not undertake the operation unless symptoms arose pointing directly to a fatal issue; on the other hand, I did not conceal from him that a certain amount of strength and vitality were necessary if we were to expect the operation to succeed. I promised to see the patient from time to time. The regimental surgeon who saw him with me supposed that I only meant to console the patient, and, though himself an able surgeon, did not fancy that operation was possible. I, however, was seriously in earnest; the hopeless condition of this amiable young man, who had, so to speak, already done with life, his calm, resolute manner, and his absolute confidence in me, inspired me with courage to attempt something exceptional; moreover, anatomically, as well as physiologically, the operation was practicable, and did not directly endanger life.

The patient lost ground more rapidly than I had anticipated; failure of appetite, increase of pain, almost complete obstruction, difficulty in micturition, insomnia, and ever-increasing doses of morphia—each and all contributed to reduce his strength.

In January, 1869, the occurrence of distension and vomiting urged me to decisive action. On mentioning to him the alternative resort of forming an

artificial anus, he begged most earnestly to be spared from this, and reminded me of my promise to operate, before it was too late. On the 3rd February, 1869, I performed the operation—the boldest and most extensive that I have ever undertaken. The anatomical conditions were as follows :— On the anterior surface of the ascending ramus of the ischium, and reaching from this point to the obturator foramen, was situated a tumour of bony hardness, equal in size to the skull of a child five years old. The base of the tumour, where it was connected to the pelvis, I estimated to be about the breadth and shape of the section of a strong man's forearm just above the wrist. The tumour was covered by the adductor and the pectineus muscles. The movements of the right leg were more or less limited in every direction. The whole of the true pelvis was filled up by an exceedingly hard growth, which however did not project above a line drawn from the last lumbar vertebra to the pelvis. By palpation through the abdominal wall, the tumour was felt to be spherical in form. The rectum was pushed quite over to the left side and was impervious three or four inches above the anus. I was unable to make out positively whether the pelvic tumour had developed from the right side, but judging from the position of the rectum and bladder, it seemed probable; indeed, in planning the operation, I started from the idea (subsequently confirmed) that the tumour within the pelvis possessed an attachment corresponding to that of the extra-pelvic growth. If the growth proved to be a chondroma (the most usual form of these tumours) it would be possible to remove the inner tumour with a blunt-pointed resection knife; in any case, a portion of the ascending ramus of the ischium could be removed without interfering with the power of walking. If the growth turned out to be an osteoma, it could certainly be cut away by means of the chain saw and chisel. If the extra- corresponded to the intra-pelvic tumour in its [attachments, the obturator artery, I judged, must be displaced upwards and outwards.

The more I considered the whole matter the more I felt encouraged to operate. The extensive suppuration in the pelvic cavity that was bound to follow the operation gave me cause for great anxiety, for even were our best anticipations realised as far as the operation was concerned, yet the unfavourable conditions, due to the situation of the wound, were such that the risk of pyæmia or septicæmia proving fatal was inevitably great. And so it came to pass.

The patient being placed in the lithotomy position, the external tumour was easily exposed by an incision made parallel with the adductors. The growth proved to be a chondroma and was easily removed from the pelvis with the resection knife. I then made an incision on the inner edge of the ascending ramus of the pubes and was easily able to separate the capsule from the intra-pelvic tumour; then, passing my hand into the pelvis, I severed the tumour from its peripheral attachments, and was able to convince

myself that the intra-pelvic tumour had the same connections as the corresponding growth on the outer side. The external tumour, however, seemed to consist entirely of bluish white cartilage, while the inner growth was cystic in nature and broke up in my hand; the remnants of the cyst were removed by cutting-forceps and the knife, the loose fragments being easily withdrawn from the pelvis. The hæmorrhage was moderate in amount, and no collapse followed after the operation, which had succeeded beyond all expectation, but after the first forty-eight hours, the amount of foul suppuration from the pelvis became enormous; no antiseptics were of any avail; the youth and strength of the patient alone enabled him to resist the septic infection up to the seventh day, when he sank and died. Duration of the disease from first to last, about four years.

Pulsating sarcoma of the pelvis.

H—, æt. 47, stated that she was the mother of five children. She had had two miscarriages, but her last confinement—about four years before her admission had been natural and easy. Three years previously, she noticed occasional pain in the right hip, and some twelve months later a tumour appeared in this region; the pain increased, and she had more and more discomfort in walking. For some little time previous to admission she had lost flesh and strength. I found a tumour, larger than a man's head, more or less spherical and of smooth surface, occupying the position of the right innominate bone. The tumour was of elastic consistence in most parts, and a distinct thrill could be felt and a harsh bruit heard, synchronous with the heart sounds. No operation was admissible, and the patient died four years after the commencement of the disease.[1]

Frau H—, æt. 46, stated that about a year before her admission, in attempting to save herself from a fall, she strained herself severely in the neighbourhood of the right hip. She always had pain in walking after this, and about four months later, noticed a gradually increasing swelling of the right iliac crest. The difficulty in walking and the pain increased. Fourteen days before I saw her she had had a fall on the affected side, and since that time had no longer been able to support herself on her right leg. The patient was a slight, spare, pale woman. The entire right half of the pelvis was pushed forward; parchment crackling could be felt over the thinned bony plates. The tumour could be traced deeply down into the pelvis; the whole tumour pulsated, and an aneurismal bruit was audible in it. The size and extent of the growth were such that there seemed to be no hope of successfully removing it; the patient died about twenty months after the commencement of the disease.

Guiseppe L—, æt. 43, an Italian miner, of small weakly frame, stated

[1] On the occasional difficulty of diagnosis in these cases see a valuable paper by Holmes "On the Diagnosis of Aneurism" ('St. George's Hospital Reports,' vol. vii, p. 173). [Ed.]

that he had suffered for twenty years from an intermittent fever, which was constantly recurring. About four years before admission, as he was lifting a heavy stone, he experienced a sudden sharp pain in the sacral region, which lasted for about a week, but was not sufficiently severe to prevent his working. The pain, though only slight, persisted at the seat of injury, and two years later, when engaged in some rather heavy work, it recurred with greater violence. He then noticed a painful swelling in the neighbourhood of the sacrum. For ten weeks he was laid up; the swelling did not materially increase, and at the expiration of that period he resumed work. About eighteen months later, when engaged in some tunnelling work, the pain in the pelvic tumour increased to such a degree that he was forced to seek medical aid. For some time, he had noticed distinct pulsation in the growth. He then came under the care of the late Professor O. Weber who attempted compression of the tumour; this treatment however, the patient would not bear, and left the hospital. While journeying to Italy, the pain increased with such severity that he was forced to stop short at Zürich. When I saw him, I found an ill-defined tumour, the size of the palm of the hand, over the right sacro-iliac joint. The growth was raised up about an inch from the surface of the surrounding parts, and the skin over it altered in appearance. The tumour was hard at the edges, of soft consistence in the centre. Pulsation was everywhere distinctly perceptible, and the whole mass was slightly compressible. No aneurismal bruit was audible. The tumour projected to some extent into the rectum, and was estimated to be of the size of a fœtal head. Subcutaneous injections of morphia and the application of cold gave him some relief; the injection of a few drops of perchloride of iron, had no effect, good or bad. Professor Weber had diagnosed pulsating sarcoma, with which opinion I concurred. Two months later the tumour had increased to such an extent that it reached from the right sacro-iliac articulation, over the right venter ilii, and from the crest of the ilium down to the sciatic notch; the growth was firm, resistant, and pulsated but slightly. The skin over the upper part was of a dull blue colour; the lower extremities were slightly œdematous. Pulsation could be distinctly felt on examination by the rectum, and the tumour had extended further into the pelvis than it did two months before; it gave, however less pain. The tumour was injected on a few occasions with Liq. Ferri Perchlor. without any material benefit. Finally, he was attacked with repeated rigors, the tumour began to increase rapidly, erysipelas followed, and he died of marasmus, four years and eight months after the commencement of the disease. Post mortem, we found a sarcoma telangiectodes cysticum of the right ilium, metatastic sarcomata in both lungs and on both pleuræ, tumor lienis, sarcoma in the thyroid gland, and metatastic myxo-sarcomatous deposit in the medullary cavity of the third rib. Microscopically the tumour was found to be a very vascular alveolar sarcoma.

Sarcoma of the pelvic cavity.

An instance of this occurred in a man, æt. 20. For five weeks the patient had suffered from darting and throbbing pains, radiating from the sacrum down the right leg, and followed after a time by obstinate constipation. The right leg then began to swell so much that the patient became unable to do his work. He was admitted into the hospital, and a tumour was discovered in the pelvis. Troubles in micturition ensued, and catheterisation became more and more difficult, so that the patient was transferred to my care. I found a soft, elastic tumour, the size of a large fœtal head, which lay behind the bladder and the upper part of the symphysis, and could be felt also from the rectum. A thick elastic catheter alone could be introduced into the bladder; the patient passed but little urine, and but a small quantity was drawn off. On puncturing the tumour through the abdominal wall only blood was withdrawn; finally, it became impossible to introduce even the elastic catheter into the bladder, and the patient passed no urine for twenty-four hours. I thereupon made an incision, six centimètres long, through the abdominal wall on to the upper border of the capsule of the tumour. The abdominal walls were so closely applied to the surface of the tumour that I had no fear of prolapse of the intestine, and merely applied an antiseptic bandage. During the following evening about an ounce of urine was voided. The next day I found that the capsule of the tumour was so firmly united by adhesions to the abdominal walls that I was forced to cut into the mass. The next night again only about one ounce of urine was passed; nothing of the tumour could be felt through the bladder; the third day I set to work carefully and scooped out the medullary mass from its capsule with my fingers, which I easily succeeded in doing. The hæmorrhage was controlled by plugging the cavity with two carbolised sponges which were removed the same evening. Now that the capsule of the tumour had collapsed the distended bladder could be distinctly felt, and by means of an ordinary elastic catheter I drew off 500 grammes of turbid alkaline urine. The catheter was ordered to be kept in the bladder, but the patient, who was somewhat troublesome, let it slip out after a few hours. During the next few days large quantities of urine were voided, some being passed naturally and some drawn off by the catheter; the capsule of the tumour collapsed more and more. I did not think there would be any danger of the intestines protruding, as the fibrinous adhesions were so firm. The seventh day after the incision, however, the patient was exceedingly restless, the result of which was that the bandage became loose and a long loop of intestine prolapsed. This was replaced and the capsule of the tumour was united by sutures to the abdominal wall, but rapid collapse set in, and he died the next day.

The sole object of the operation, viz. to allow the escape of the urine, was attained; more than this was not possible, for we found

subsequently that total removal of the tumour would have been quite impracticable; moreover, numerous metastatic tumours existed in the liver and the lungs. If I met with another case of this nature, I should unite the capsule firmly with sutures to the abdominal wall before proceeding to évidement of the tumour.

Medullary spindle-celled sarcoma.

B. H—, æt. 29, a joiner, a short, strong man, noticed in January, 1865, a hard lump the size of a pea, between the nates two inches above the anus. The nodule was situated in the skin, and at the outset gave him little discomfort beyond a burning sensation if it were touched. After a time, however, it grew more rapidly and became painful. A medical man, who was called in, took the tumour to be a boil, and ordered poultices. A few days later an incision was made but blood only escaped: the wound would not heal, and a fungus-like mass protruded through the opening. In May, 1865 (four months after the commencement of the disease), the growth was cauterised with a hot iron; this did, however, but little good, for directly after the eschar separated, fresh growths protruded; the surface became gangrenous, hæmorrhage took place from it at times, and the patient lost strength. When he was admitted at the end of November, 1865, though rather pale, he was a well-nourished man. An ulcerated fungating tumour, the size of the palm of the hand extended upwards from the anus for about four inches. I completely extirpated the growth, taking care to cut through skin that to all appearance was healthy, a full inch wide of the base of the tumour. In a month the patient was discharged with the wound nearly healed. Four months later he returned; the wound had completely cicatrised, but very shortly after this had happened, a fresh nodule became perceptible at the old spot. I found on examination, an ulcerated mass, the size of an egg, situated in the cicatrix; immediately around were several isolated movable tumours of the same size. I advised immediate operation, but to this the patient would not consent, and he died a month later of trismus and tetanus. From first to last, the disease had existed for sixteen months.

Cancerous disease, developing in a congenital coccygeal tumour.

Therese L—, æt. 55, an anæmic, weakly woman was admitted with a tumour over the sacrum, of tolerably firm consistence. Her mother had told her that the growth was of congenital origin, and at birth was the size of a hazel-nut. The tumour gave no pain, and increased slowly for the first few years, but scarcely any growth had taken place since she was nine years old. As the result of a fall at that time, the tumour became inflamed and swollen. An opening was made into it by a medical man and pus and blood were let out; the opening had never closed

since. Some years later, two fresh openings formed, from which at times severe hæmorrhage took place. I found a tumour the size of a man's head dependent from the sacral region, ulcerated in parts. The growth was removed, and proved to be a cysto-sarcoma, in the centre of which was a curiously formed mass of cartilage. At the lower end of the sacrum, the growth was not very sharply defined; a few cysts extended down into the depth of the bone which were not followed up. The cysts were found to be lined with ciliated epithelium. The epithelium of the ulcerating cysts was arranged in thick multiple layers, in which two distinct forms of cells were found, closely resembling those seen in epithelial cancer. No projections or gland-like ingrowths of the epithelial masses could be traced into the interstitial connective tissue. The wound did not completely heal, and the remnants of the cyst epithelium projected fungus-like, extending also into the surrounding tissue. The surface of the wound resembled in appearance that of a carcinomatous ulcer; the right inguinal glands became enlarged and broke, and fungating masses which microscopically were identical with epithelial carcinoma, projected from the openings.

This case is of the highest interest as showing that a congenital cystic tumour may, at a late period of life, acquire cancerous characteristics and become infective. We heard subsequently that the patient died a few months after leaving the hospital. The post mortem revealed nothing that had not been already discovered.

CHAPTER XVI.

INJURIES AND DISEASES OF THE UPPER EXTREMITY.

SECTION A. INJURIES.—*Cases of frost-bite. Case of paralysis and atrophy of arm after injury. Cases of paralysis of the musculo-spiral nerve after contusion. Case of contusion of the elbow—death. Contusion of wrist—excision. Contusion of arm—death. Injuries of the hand and fingers—Cases. Wounds of the hand. Fracture of the clavicle—treatment. Fracture of neck of the humerus—treatment. Fractures of lower end of humerus—treatment. Badly united fractures—Cases. Case of paresis after oblique fracture of radius and ulna. Case of ankylosis after fracture. Fracture of lower end of radius. Cases of pseudarthrosis. Paralysis of musculo-spiral nerve after fracture of humerus—Cases and remarks. Paralysis from the use of crutches. Dislocation of humerus—death. Paralysis and atrophy after dislocation of humerus. Cases of irreducible dislocation; paralysis after dislocation. Dislocations of ulna; of thumb. Penetrating wound of shoulder-joint—excision. Case of multiple pyæmia—recovery. Case of penetrating wound of elbow-joint. Seven cases of compound fracture of elbow—remarks.*

Frost-bite.

A man, æt. 52, was admitted with frost-bite of the hands and feet; he was attacked with tetanus, from which, however, he recovered. Unfortunately a complete record of the case is wanting.

A man, æt. 36, was admitted with both hands frozen through driving for seven hours in very severe cold. The demarcation first showed itself in one hand six days after admission. The soft parts were pushed back with a blunt elevator, and some of the phalanges removed. In the other hand, isolated

patches of skin only were gangrenous. Some stiffness of both hands persisted for a long time, but eventually disappeared.

In this instance, the effect of the cold gradually diminished from the little finger to the thumb, so that the index finger was least affected, while the thumb had entirely escaped.

In other cases it was found that much the same parts were affected, *i. e.* the third, fourth, and little fingers were most commonly involved, the index finger less frequently, while the thumb was most rarely affected. In one case, however, where all the fingers were completely gangrenous, one half of the thumb was in the same state. In the foot, too, the great toe seems less subject to frost-bite than any others. When the gangrene extends over the hand from the fingers, it usually extends further on the dorsal than on the palmar aspect.

Paralysis and atrophy of the arm, following injury.

Peter P—, æt. 47, was admitted in 1876. Five months previously he had received a blow on the left shoulder from a falling branch. The blow knocked him down, and occasioned severe pain. A medical man who was called in could find no fracture or dislocation, but only a contusion. The nervous symptoms did not appear to have altered from the first; the muscles of the left shoulder and arm were markedly atrophied; the flexors of the left hand were contracted. All movement was completely lost in the left hand; sensation, though very much impaired, was not totally absent. The pain which he had at first experienced had ceased when I saw him. Faradisation caused very feeble contraction of a few of the muscles, but no improvement followed the persevering use of this treatment, and the atrophy of the arm steadily progressed.[1]

Paralysis of the musculo-spiral nerve after contusion.

J. A—, æt. 31, a railway guard, had his upper arm severely contused as his train was entering a tunnel. Swelling of the limb soon followed. When he was brought to the hospital shortly after the accident, the musculo-spiral nerve was found to be paralysed. Extensive inflammation of the arm followed, but disappeared without any suppuration. The extensors of the

[1] An interesting case of progressive paralysis after injury of the shoulder is recorded by Dr. F. Steiner, in the 'Wien. Med. Woch.,' 1873, p. 592, where will also be found a collection of other cases of the same nature.

arms were regularly galvanised, and after four months he regained some power, so that he could move his fingers and hand to some extent, but the function of the hand was permanently impaired. Of the ultimate result of the case I have no record.

Johannes B—, æt. 30, was injured fourteen days before admission in the following manner: while driving a heavily laden three-horse waggon he was thrown out, his left arm became entangled in the reins, and his clothes were caught by the wheel. When he succeeded in stopping the horses he found that his arm was caught under the wheel, and he could not release himself. In this situation he remained for four hours, until another waggoner, who happened to be passing by, extricated him. Great swelling of the injured limb followed, and after four days the blood, extravasated in the cellular tissue of the upper arm, broke down, and suppurated. After a time the swelling subsided, but complete paralysis of the musculo-spiral nerve became evident. Doubtless this had existed from the commencement, but was masked by the swelling and immobility of the limb. When he was discharged after a month the wound had healed, but the paralysis was unaltered; subsequently the latter affection disappeared spontaneously, and when I saw him a year later he was perfectly well.

Contusion of elbow. Death.

In the case of a man, æt. 48, permanent swelling remained after a contusion of the elbow-joint; the patient had not sought for any treatment, but had gone on with his work as a mason, in spite of the pain in the part. Two months after the injury an acute abscess formed, and for a long time it was doubtful whether it would penetrate the joint; eventually it became evident that it had done so, and resection of the elbow-joint was proposed; to this, however, the patient would not submit, and he died of pyæmia.

Contusion of wrist. Excision.

Jacob Pf—, æt. 33, a strong man, fell from a height of about eleven feet on to a heap of loose stones, and injured his hand and forearm. In spite of severe pain he went on with his work for a few hours. When admitted into the hospital a week later no fracture could be positively made out. The arm was put up on a splint, and iodine and ice applied. After a time the pain became localised in the wrist, and he had all the symptoms of subacute inflammation of the joint, which progressed in spite of rest in plaster splints and treatment with ice. Eventually suppuration took place in the joint. I trusted that ankylosis might eventually take place without surgical interference, but the patient became much reduced, and as the extension of the disease showed no tendency to stop, I determined on excision of the wrist. Two lateral incisions were made, and all the carpal bones, together with the articular ends of the radius and ulna were resected. The bones

removed were softened, and their cartilaginous covering almost completely destroyed, while the ligaments of the joints had degenerated into spongy granulation tissue. The operation at once exerted a most beneficial effect on his general condition. The febrile symptoms subsided, and the patient rapidly recovered. In about six months the sinuses closed, and he was able to use his hand for light work. When discharged he could flex and extend the hand and the first two phalangeal joints to some extent, and passive pro- and supination were permitted. The metacarpo-phalangeal joints were as before stiff, and allowed of very little movement.

Contusion.

Karl G—, æt. 36, an ostler, received a kick from a horse on the right side of the breast and axilla. He was knocked down by the blow, but did not lose consciousness, and was able to do light work for the next two days. He then applied for admission at the hospital, as the swelling began to increase. Over the right upper half of the chest, axilla, shoulder, and upper arm, the soft parts were indurated by phlegmonous infiltration, and in the deltoid region were numerous ecchymoses of the skin. No fracture could be made out; iodine was painted over the swelling, and ice applied. The same evening the patient sank into a semi-unconscious state, with nocturnal delirium and picking at the bed clothes. Collapse set in, and he died seven days after the injury. At the autopsy sero-sanguineous infiltration of the subcutaneous and inter-cellular muscular tissue found over the right side of the thorax. In the cellular tissue of the axilla, and around the blood-vessels, were localised abscesses containing greenish-yellow pus; the vessels themselves contained fluid blood. The brain, the cerebral membranes, and the lungs were congested; the liver fatty.

Injuries of the Hand and Fingers.

The various industries in the Canton Zürich brought a great number of these cases under observation, especially injuries from machinery. In almost all, treatment with the continuous water bath was adopted, the constant application of ice being sometimes substituted; amputation of the fingers was very rarely performed. I always allowed the gangrenous portions to separate of themselves, and the results of this conservative treatment were very satisfactory. At times fingers were thus preserved of which at first there seemed but little hope.

A girl, æt. 7, caught her left hand between the rollers of a machine. The skin was completely torn off the hand up to a little above the wrist-joint.

No bone was broken or joint opened, and the hand was exactly like an anatomical preparation.

A boy, æt. 18, caught his arm in a moving windmill; the humerus was fractured about an inch and a half below the joint and the skin torn off from the shoulder, the axilla, and in part from the back; below the point of fracture the arm was completely torn away. I left the stump of bone as it was, partly because without taking flaps from the chest I could not have got soft parts to cover it, and partly because I did not think the patient could long survive the injury. There was no hæmorrhage. The case did surprisingly well, and the huge wound granulated up slowly after the removal of the stump of bone four months subsequent to the injury.

Fracture of the Clavicle.

In hospital practice, as is well known, but little is usually done to correct the displacement of these fractures. The moment the patients are free of pain and can use their arm a little they are sent out. Something can be done towards diminishing the displacement by careful and repeated application of Dessault's or Brünninghausen's apparatus, or Sayre's plaster bandage. Many of these fractures, it is true, are attended with only a small amount of displacement. In children slight bendings often occur, which remain unnoticed by the parents until callus begins to form. In adults I never succeeded in adjusting and preserving the fragments in perfect position if the dislocation were of any great extent. I never saw any loss of function in the affected extremity, even when the fracture united with a considerable amount of displacement. When opportunities occurred of seeing these cases some years after the injury, I was often astonished to see how far the projecting ends of the fragments had become absorbed, and the thick mass of callus levelled down. Numerous preparations in our museums show how greatly these deformities improve by the lapse of time.

Patients with this injury, when there was little or no displacement of the fragments, were treated from the first with a Mitella. When displacement existed the different forms of bandage that have been recommended were employed, but no great improvement to the deformity was ever gained by their use. I had previously, when at Berlin, convinced myself of the uselessness of these bandages for fractures of the clavicle attended with displacement, so that now I employ merely the axillary pad and bandage in all cases. To my pupils I recommend the axillary

pad with Dessault's bandage, Brünninghausen's strap, and other apparatus, and show them these forms of bandage in order that they may employ them in their private practice and avoid the charge of neglect. At the same time I always take the opportunity of pointing out to them that these bandages are practically ineffective. If they are to be of any use the patients must be kept lying for at least a fortnight, and the bandage must be reapplied very often. It is not very often possible to induce these patients to lie still in bed, and in the case of restless children it is least of all practicable. As to the success of the treatment we may easily deceive ourselves. The amount of callus appears to be very large, when it surrounds the displaced ends of a fractured clavicle. Ultimately it completely disappears, and then there is but little to be seen or felt. This, however, is not due to the surgeon or the bandage, but is brought about spontaneously. It is well known that fracture of the clavicle, though united in a faulty position, does not lead to any loss of function.

Fracture of the Surgical Neck of the Humerus.

In treating this injury, I have employed divers apparatus and appliances which have been recommended in order to correct the displacement. My best results were obtained by constant extension by weights and Gussenbauer's apparatus (described in the 'Wien. Med. Woch.,' 1874, No. 41). By means of this apparatus constant extension is kept up, and the patient is able to be up and about. If any displacement results the form of the shoulder is very much disfigured. I have never seen any functional loss from the oblique union of these fractures.

Fractures about the Lower End of the Humerus.

All these cases were treated (at Zürich) by plaster bandages, applied as early as possible. The arm was kept in an extended or flexed position as seemed best for the dislocation. Speaking generally, the shape of the elbow-joint and the position of the fractured articular ends can be better preserved when the arm is put up in the extended position, but this rule is not without exception; if

this position be adopted the patients are forced to keep their beds. It is of the greatest importance to renew the bandage at the latest after ten or fourteen days. Slight dislocations may then be corrected by pressure with the fingers or by movement of the joint, which at a later stage will not be so easily done. After four or five weeks passive movement of the joint may be cautiously commenced under chloroform. It is a great drawback that we are unable to make out the exact nature of all these fractures, on account of the extravasation in the joint, and are thus debarred from giving a clear prognosis as to the ultimate utility of the limb. I think I may state from my experience that the cases did better, and that the joint was ultimately more useful, where a plaster bandage was at once applied than where no apparatus except a Mitella was employed.

Badly united Fractures.

Six cases of fracture into the elbow-joint were admitted, in which fragments of the external or internal condyle had united with the lower end of the humerus in such a way that the function of the joint was impaired. In many of these cases subluxation or luxation of the radius had taken place. As a rule the results of treatment are unsatisfactory; in one instance only was complete mobility obtained.

In some of these patients the power of flexion and extension, and in others pronation and supination were destroyed.

In a boy, æt. 14, who was admitted with a fracture of the condyle of three weeks' date, the limb was forcibly extended, and put up in plaster. A fortnight later passive movement was again employed. Within two weeks he had some movement in the part, and he ultimately recovered the full use of the limb.

In the case of a child, who had fractured her external condyle, and dislocated the radius four months previously, and who was admitted with the arm ankylosed at an obtuse angle, resection was performed. She recovered, but the arm became ankylosed at a right angle and remained so in spite of many attempts to obtain some movement.

From these cases it may be gathered that the movement of the elbow-joint, after fracture of the ends of the bones forming the

joint, is less capable of restoration when the patients come late under treatment, than when a plaster bandage is applied immediately after the injury. In most of these cases the exact nature of the injury is not recognised; in these fractures, as also in those of the lower epiphysis of the radius, surgeons are often more on the look out for sprains, dislocation or contusions than fractures; much time is lost in applying leeches, douches, etc., while in the meantime the small displaced fragments of bone are allowed to remain in a position unfavourable to the movement of the joint, and thus the numerous ankyloses are caused. More extensive use of anæsthetics is advisable in examining such fractures.

If the limb be strong, and the patients are able to use it in their work, I do not think we are justified in recommending excision of the joint very strongly; it cannot be said that the operation is absolutely without risk (who would lose his life on account of a stiff elbow-joint?), and, again, movement cannot be positively guaranteed after operation, even though the entire joint be freely excised. That this is so I have seen in three cases, one of which I operated on myself. If the joint be ankylosed in an extended position or at a very inconvenient angle, of course we may advise excision.

Very oblique fracture of the radius and ulna.

A boy, æt. 6, had fractured both bones of the forearm about the centre, six weeks previous to admission. Union had taken place with the arm strongly bent over to the volar side. The joints between the first and second phalanges were contracted, giving the hand a claw-like appearance. The radial ulnar and median nerves were partially paralysed; it seemed probable that one of the nerves was included in the callus. Under an anæsthetic, the deformity was rectified and the paresis and contraction disappeared completely after a few months under the use of galvanism.

Partial ankylosis after fracture into the elbow-joint.

Jacob B—, æt. 16, fell heavily five months before his admission on to his left hand; ever since that time the movement of the elbow-joint had been impaired; he had never had any bandage applied, but merely a plaster. I found his arm bent at the elbow at an angle of 100°, and very slight mobility of the joint on passive movement only. A mass of callus could be felt about the internal condyle and olecranon; forcible passive movement

was daily employed and after two weeks the mobility of the elbow-joint was decidedly increased.

Fracture of the Radius only.

Among 103 cases of this injury the majority were fractures of the lower epiphysis.[1] I usually put up the arm in a plaster bandage. Such fractures are often complicated by fissures extending into the wrist-joint or extravasation of blood, and lead to stiffness of the joint which often lasts for weeks or months; the tendons, too, become united by adhesions to the inner surface of the sheaths. Passive movement, rupture of the adhesions (which is frequently exceedingly painful), and soaking the hand in water in all cases effected a cure.

Among six of these patients who died of other injuries, we found usually on examining the fractures after death that in addition to the transverse fracture of the lower epiphysis fissures extended into the wrist-joint. There is little doubt that this accounts for the stiffness of the wrist-joint, which in many patients, especially in the elderly, persists for so long a time after fractures of this nature.

Pseudarthrosis.

A man, æt. 39, was admitted who, two years previously had sustained a compound fracture about the centre of the right upper arm; no pieces of bone had come away. The fracture was treated originally with splints, and then put up in a paste bandage. As after sixteen weeks no union had taken place, the treatment was given up. When admitted the arm was much wasted and could be moved in any direction at the seat of fracture. I cut down on the pseudarthrosis, bored through the two fragments, and united the bones with a stout leaden wire. The limb was put up in a plaster bandage with a window. A considerable amount of reaction and suppuration followed. The suture was removed three months after the operation; there was then abundant callus, and the fracture was well consolidated.

Elizabeth M—, æt. 38, was admitted with a compound comminuted fracture about the middle of the right humerus, and other severe injuries. The fracture was put up at once in a plaster bandage. Subsequently some fragments of bone became necrosed and were removed, and the wound healed up, but the callus did not consolidate. I saw her a year

[1] Colles' fracture. [Ed.]

after the injury, and tried unsuccessfully to induce union by repeatedly rubbing the fragments together, and applying iodine. I then operated on the fracture after Dieffenbach's manner, by inserting ivory pegs; in the course of eighteen months, the union was sufficiently firm for the patient to discontinue her bandage. Three months later, however, the fragments again separated; and the patient was discharged as unimproved.[1]

A healthy, strong man, æt. 35, was admitted with an ununited fracture, about the centre of the humerus. The injury, which had been sustained six months previously, had at first been treated with splints and afterwards with plaster of Paris; the fragments were very movable. I cut off the ends obliquely, united the bones by two platinum wires, and applied a plaster bandage. The patient went back to his native place—Alexandria—eighteen days after the operation; the wires were removed there, two months later. The patient came back to me a year or two subsequently, and his arm was then perfectly strong and well.

A strong man, æt, 41, came under treatment for a condition similar to the above: in this case, however, the mobility between the fragments was very extensive; the lower portion of bone was knobbed at the extremity, and directed inwards, while the upper was atrophied, thin, and displaced outwards. The muscles of the arm were much wasted. On cutting down on the ends of the bones, I found them covered with cartilage and softened; the extremities were removed, and the fragments wired together by platinum sutures. Osteo-myelitis followed, and the upper fragment necrosed up to the shoulder-joint. After this he had a severe attack of erysipelas. Three months after the operation I removed the sequestrum. There was still some movement at the pseudarthrosis when he was discharged four months after the first operation, but the arm was much thickened by new periosteal bone. I was unable to learn the ultimate result.

Paralysis of musculo-spiral nerve after fracture.

A child, æt. 6, sustained a fracture of the arm, about two inches above the elbow-joint. Fourteen days after the injury he came up to the hospital with the limb put up in a paste-board splint. The fragments, which were but little displaced, were invested with a moderate amount of callus. The second, third, and fourth fingers were flexed, and contracted at the phalangeal joints and also at the wrist, and the patient was unable to extend the hand and the fingers. We diagnosed paralysis of the musculo-spiral nerve, resulting from the pressure of the callus. Neither the father nor the medical attendant of the child could state whether this paralysis occurred at the time

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[1] It does not appear that in either of the above cases the urine was examined. The frequent association of alkaline urine with ununited fracture has been commented on by numerous writers though no very satisfactory explanation has as yet been given of their connection. [Ed.]

of the injury or came on at a later period. The fracture united well, but the deformity of the hand remained. Galvanisation of the muscles gave no benefit. Five years afterwards the paralysis was in *statu quo*.

It is possible, from the seat of fracture in this case, that the nerve was also lacerated. If the anatomical arrangement of the parts be considered, it seems curious that this injury does not occur far more frequently.

Paralysis of musculo-spiral nerve after fractured humerus.

A man, æt. 36, fell from a waggon and was dragged along some little distance, with his arm under the front wheel. On extricating himself, he found that he was unable to use the limb. A medical man applied a splint, which was kept on for eight days, and then cold compresses were employed. He came up to us twelve days after the injury. The humerus was fractured at the junction of the upper and middle thirds. Corresponding to the upper level of the fracture, a portion of the skin, about two inches in length was gangrenous. The fracture consolidated in about six weeks, by which time the wound was almost healed. Paralysis of the musculo spiral was found to exist when he attempted to move his arm. The hand and forearm were so swollen on his admission, that the impaired mobility was not at the time suspected to be due to nerve injury. In addition to the total paralysis of the musculo-spiral, paresis of the parts supplied by the median nerve and some of the cutaneous branches was found to exist. No extension whatever could be effected at the wrist or fingers.

By means of continued galvanism, the condition was so far improved within a few months that sensation returned in all parts. Flexion of the fingers was not quite perfect. Extension of the hand and fingers could then be slowly effected.

This case is, further, one of special interest from the fact that, though the fracture was simple, necrosis of some fragments took place. It would be, perhaps, better to say that the fracture was subfascial instead of subcutaneous, for, as mentioned above, a small portion of the skin was gangrenous though the fascia was uninjured.

The patient was twice attacked by erysipelas after the fracture had united, and abscesses formed about the site of injury; the latter healed up, leaving only a small sinus; on the opposite side of the limb beneath the skin, which was perfectly normal, could be felt some thickening due to invaginating bone; subsequently, two small sequestra were removed at this spot.

E. F—, æt. 6, fell down some stairs and sustained a fracture of the humerus which was treated by splints. Union took place, but the hand could not be moved. No improvement followed, as the result of his taking sixty mud baths and a great many soap baths (Seifenbäder). He came up to the hospital about five months after the injury; the forearm was completely pronated, and the hand flexed. The fingers were extended at the metacarpo-phalangeal joints, and strongly flexed at the distal phalangeal joints, the thumb alone being extended; the fingers and hand were cold and of a bluish colour. Very slight active movement took place at the wrist; sensation nowhere lost. Half an inch above the elbow-joint, a small, hard prominence of the humerus was perceptible, and just below this, on the flexor aspect, a cicatrix an inch in length. The child was placed under Professor Benedict's treatment, and the constant current was employed for three weeks. The thenar muscles alone answered to the galvanism, and this treatment led to no improvement.

The analogy of the above with the other cases already described gives room for the supposition that the musculo-spiral and median nerves were, in all probability, involved in the callus. By partially gouging away this callus and freeing the nerve, it appeared to me that the functions might be restored; accordingly I dissected out the musculo-spiral nerve from the groove between the supinator longus and the biceps, exposing it for four and a half inches, up to its dorsal branch. The nerve was normal in appearance, neither thickened nor atrophied, and perfectly free from the slightest adhesion; but it did not answer to irritation by the point of a needle, nor did any action take place when the pole of a rotatory electric apparatus was applied directly to it. When the nerve was touched quite at the upper part contraction of the triceps followed.

As no alteration could be detected in the nerve, and particularly as no adhesion was discovered, the wound was closed; after the effect of the anæsthetic had passed off the patient complained of some pain in the right arm which yielded to a morphia injection. The wound healed rapidly, the greater part by first intention. For the next three weeks the condition remained unaltered. Galvanism was then resorted to again for a month, at the end of which time Professor Benedict noticed the following singular phenomenon:—When both poles were applied to the affected arm no effect was manifested, but if the second electrode were laid on the sound arm, the muscles of the forearm and fingers on the affected side contracted, and this contraction was the more forcible according to

the length of muscle lying above the point of application of the electrode; if, for instance, the electrode were applied to the dorsum of the affected hand, the extensors contracted more powerfully than when the application was made to the extensor aspect of the forearm. This latter phenomenon cannot be readily explained. The fact that contraction only took place on the application of the electrodes to both arms must be taken as a proof of the great diminution of muscular irritability. No benefit was derived from this second course of galvanism.

As in this case, the distribution of the median nerve was affected as well as that of the musculo-spiral, it was decided to investigate the condition of the former nerve. To all appearance, however, it was found to be perfectly unaltered. A thin plate of glass was then laid under the nerve after it had been exposed in order to ensure its more complete isolation. The pole of a rotatory electrical apparatus, and subsequently the constant current, was applied directly to the trunk of the nerve; one of the flexors of the thumb contracted faintly. On employing the nerve-muscle current the muscles contracted rather more. A little piece of muscular tissue was taken from the pronator teres and examined microscopically; the fibrillæ were found to be rather thinner than usual, but the striation was perfectly distinct. The wound was then closed and healed up rapidly; the child left the hospital unimproved in the matter of the paralysis.

Inasmuch as in this case there was no direct injury to the nerve the symptoms must be ascribed to reflex paralysis—a condition of rare occurrence.

O. K—, a boy, æt. 8, was brought to me with an obliquely united fracture of the humerus of six weeks' standing, and paralysis of the musculo-spiral nerve. The latter had been noticed when the bandages were removed. I broke down the callus, which was tolerably soft, put the arm straight and applied a fresh bandage which was removed a month later. By means of faradisation, the function of the hand began to improve and in the course of three months, the paralysis had almost disappeared.

J. G—, æt. 41, came up to the hospital with paralysis of the musculo-spiral nerve, which had been noticed soon after a fracture of the forearm, sustained four months previously. Faradisation was pursued regularly for two months and the functions of the hand were somewhat improved.

It would appear that the prospect of recovery in paralysis of the

musculo-spiral after injury, whether with or without fracture, is very small if improvement does not show itself within from three to six months. Whether electricity conduces to recovery is to my mind doubtful, for probably in most cases the lesion consists in direct contusion or stretching of the nerve trunk at the time of the fracture. It depends on the degree of severity of these injuries, and on the consequent anatomical changes, whether the regeneration (the capability for which, unfortunately, in man is limited) of the damaged nerve-bundles suffices to restore function or not. The results of paralysis of the peroneal nerve following immediately after sudden straightening of genu valgum, fully confirm these statements.

In three cases of paralysis of the musculo-spiral nerve resulting from long-continued use of crutches, the patients—aged respectively twelve, eighteen, and forty-five—recovered completely in about two months under the employment of faradisation, after the use of the crutches had been forbidden.

Dislocation of the humerus. Death.

Johann G—, æt. 59, a decrepid old man, who had suffered repeatedly from rheumatic inflammation of the joints, while walking carelessly fell into a pit and struck himself on the left shoulder. The joint swelled up and became painful; soon after the injury he had a severe rigor. Six days later, when he came to the hospital, I found the right humerus dislocated forwards and marked swelling about the shoulder, over which the skin was brownish red and emphysematous. The patient was very weak, the pulse small, and temperature low; no fracture of the ribs could be detected. The dislocation was reduced without difficulty. During the next few days, the collection of gas about the joint constantly increased. The swelling lay close under the clavicle and reached up to the axilla; although it was undoubtedly filled with gas and blood I hesitated to make an incision into it for fear that I might open the shoulder-joint. In the man's condition he could not have survived suppuration of the joint, resection, or exarticulation. The tumour rapidly increased in size, till the skin became as thin as paper; meanwhile, the patient became more and more collapsed. Fourteen days after the injury, I decided on opening the cavity, which I found full of gas and foul pus; collapse followed and death took place fifteen days later—about a month after the dislocation. Post mortem: no fracture of the rib could be discovered, so that the case appears to have been one of those rare instances where the blood extravasated at the time of the dislocation decomposed with generation of gas.

Paralysis and atrophy after dislocation of humerus.

A man, æt. 40, who had dislocated his right humerus nine months previously, came to the hospital with complete paralysis of the forearm and commencing atrophy. By means of Schneider-Mennel's apparatus reduction was effected, but the arm remained as before, completely paralysed as regards sensation and motion.

Probably the brachial plexus had become adherent to the dislocated head of the humerus, and was torn in effecting reduction. It is, I think, better in such cases not to attempt reduction, but to excise the head of the humerus, as has been done successfully by von Langenbeck, in cases of paralysis from pressure.

H. H—, æt. 51. The previous history of this highly exceptional case is unfortunately very incomplete. The patient was attacked with a rigor, and at the same time with swelling and redness of the whole right arm, so that it was not possible to examine the shoulder minutely. I suspected acute cellulitis, perhaps accompanied with thrombosis of the axillary vein, since the subcutaneous veins of the shoulder were much distended. Under the application of mercurial ointment and ice, the tumefaction of the arm subsided, except about the shoulder, where fluctuation soon after became evident. The skin remained red, the febrile symptoms increased, and the pain in the swelling persisted. There seemed, then, no doubt that a large abscess had formed, and I waited for it to open spontaneously; this, however, did not take place, and eventually (about forty days after the commencement of the symptoms) I made an incision close under the acromion. No pus came, but about a pint of turbid, serous fluid escaped, containing flakes of fibrine. On introducing my finger, I found a large cavity lined by smooth membrane, at the bottom of which the head of the humerus could be felt, dislocated forwards and inwards. As suppuration in the cavity seemed now inevitable, I made a second incision, near the pectoral muscle, and passed in a drainage tube, bringing it out at the first opening. Severe febrile symptoms ensued with rigors, and he died of pyæmia three weeks later. Post mortem: the dislocated head of the humerus was found completely atrophied and covered by papillary osteophytes. It articulated with a false socket, formed between the glenoid fossa of the scapula and the ribs.

I am at a loss for an explanation of a case such as this; at any rate, an immense synovial cyst, which perhaps had extended through the capsule of the joint, lay around the luxated head of the humerus. But how had the dislocation taken place? The patient had given no

account of any injury, yet he must have sustained one a long time previously; or was the condition the effect of an arthritis deformans? Such a result must be very rare. Unfortunately, the records of this case give no information as to whether there had been any previous disease or injury about the shoulder.

Irreducible dislocation of the shoulder of five weeks' standing.

Cecilie H—, æt. 53, was admitted for a sub-coracoid dislocation of the humerus, the result of an injury five weeks previously. A medical man who saw the case at the time supposed that he had effected reduction under an anæsthetic. Every new—and old—method was tried in turn without success. Finally, we were forced to desist owing to considerable swelling of the arm. Within a couple of weeks the extravasation and swelling had disappeared, and the movement of the arm was then more free than on admission, which was probably due to our having broken down some adhesions.

Irreducible dislocation of the shoulder of six weeks' standing.

Dominic F—, æt. 53, was admitted with the following history:—Six weeks previously he fell from a cart on to his right shoulder. He went to a medical man, who diagnosed a fracture of the humerus, and applied splints. Five weeks after the injury a surgeon discovered that the arm was dislocated, and endeavoured in vain, with the aid of three strong men, to reduce it. On admission the head of the humerus could be felt in the axilla; the movements of the arm were tolerably free. It was found impossible to reduce the dislocation although the methods of von Pitha, Schinzinger, Heine, etc., were tried in turn. Twelve days later a further attempt was made with the Schneider-Mennel's apparatus, and still more force employed. Even this was in vain, and the man left with the dislocation unreduced.

The following case, in which reduction was effected, is worthy of mention, on account of the complete paralysis of the upper extremity:

Antoine M—, æt. 50, fell from a height of about twelve feet on to his outstretched left arm. Two days later he came to the hospital; the head of the humerus could be felt in the axilla, and was reduced with the greatest ease. The arm was put up in the ordinary way in a mitella. The pain soon subsided, but as the patient was unable to move the arm he came back twelve days after the injury. Sensation and motion were lost in the arm

and forearm. Within four weeks of the injury sensation was restored, but mobility did not return; the patient was then transferred to the electro-therapeutic department.

Reduction was so easy in this case that most probably the nerves were either bruised or partly lacerated at the time of the injury.

Dislocation of the ulna backwards at the elbow-joint.

This injury was observed in the case of a man, æt. 28, who came up to the hospital a fortnight after the injury. Reduction was easily accomplished, but the bone would not stay in position; probably the coronoid process was also broken off at the same time. He recovered with complete mobility of the joint.

Dislocation of the thumb.

An intemperate man dislocated the first phalanx of his thumb on to the dorsal surface of the metacarpal bone. He came up to the hospital four weeks after the injury. All attempts to reduce the dislocation were unsuccessful until I made an incision through the capsule of the joint. A plaster of Paris bandage was applied. Slight gangrene of the skin took place under the bandage. In due course the slough separated, but the patient was attacked with erysipelas, starting from a slight graze on the nose, which extended over the whole body, and carried him off after three weeks. The fatal result in this case could not, therefore, be directly attributed to the injury of the thumb.

In another case the patient, a man, came to me two weeks after the injury with a dislocation of the second phalanx on to the dorsum of the first. I was unable to effect reduction until I had resected the head of the first phalanx.

Suppuration of the shoulder-joint. Excision.

In a child, æt. 13, who had suppuration of the shoulder-joint, resulting from a penetrating wound, I excised the head of the humerus, sawing through the anatomical neck of the bone. Recovery followed in two and a half months, but when the child left the hospital I found that the great tuberosity of the humerus, which had been left behind, was drawn up under the acromion, so that I fear the power of raising the arm may have been materially impaired.

If this were the case it would be proper always to resect at the surgical neck. Still, the cicatrices after the resection of joints are

always capable of great extension in moving the limb, and it is therefore possible that the mechanical condition of the joint materially improved. Unfortunately, the patient did not come up to see me again.

Secondary amputation of the forearm—multiple pyæmia—recovery.

Joseph Z—, æt. 29, a house-porter, was wounded, during a quarrel, by a cook's knife on the forehead and forearm. The wound on the forehead was about an inch long, and had sliced off a thin layer of bone. On the dorsal side of the right forearm was a wound a quarter of an inch in length, extending down to the cellular tissue, and over the wrist another small wound; these were all united by sutures, and healed for the most part by first intention. Subsequently, however, swelling began in the neighbourhood of the wounds, the union gave way, and suppuration followed. Under wet compresses, the swelling and redness of the forehead disappeared, but that of the forearm increased, in spite of constant applications of ice. Ten days after the injury, a splinter of glass, an inch in length, was removed from the wound in the forehead, and two days later, a second fragment. The patient supposed that these had got into the wound while he was being dragged along the ground. On the eleventh day a severe rigor occurred; during the next six days he had six more (temp. up to 104°). In the meanwhile the swelling in the forearm increased, and extended up above the elbow. Incisions were made, and some ill-smelling, dirty pus let out. After the sixth rigor, the patient submitted to operation, which previously he had obstinately refused, and circular amputation was accordingly performed at the middle of the upper arm. The tissues cut were apparently healthy; the hæmorrhage was restrained by six acupressure needles, one suture only was applied, and open treatment adopted. From this time the rigors ceased. Five days after the amputation he coughed up some spherical lumps of purulent matter, and had stabbing pains in the left side of the thorax; ten days later, there was marked pleuritic effusion on the right side, followed after five days by hæmorrhagic diarrhœa which lasted for several days. The purulent sputa continued for about a month; the wound then gradually healed, and in about ten weeks the patient left the hospital recovered.

This remarkable case shows that recovery may follow after severe multiple pyæmic poisoning.

The patient had had six very severe rigors, and the copious, purulent sputa, occurring in the form mentioned, made the existence of abscess in the lungs highly probable, although no elastic tissue could be found in the expectorated matter. Unquestionably he had pleurisy of the left side which was probably set up by the abscesses

in the lungs. Finally, diarrhœa attended by hæmorrhage persisted for ten days, yet when all further source of infection was removed by amputation, the patient recovered from the effects. Such cases, unfortunately, are only too rare.

Compound fracture into the elbow-joint. (Z. B.)

The following seven cases came under observation in Zürich :

J. W—, æt. 50. This man's right olecranon was cut through by the knife of a straw-cutting machine, and a wound an inch and a half long made in the skin. Two days after the injury complete resection of the elbow-joint was performed. The wound did not heal perfectly for six months. When the patient was discharged he was able to flex and extend his arm and had some power of pronation and supination.

I saw him four years later and was astonished to find how much the arm had altered for the worse. The forearm was displaced upwards and backwards for three inches, but it could be brought down to its normal position. The amount of lateral mobility was excessive. Active movements were very limited, but the utility of the hand certainly was quite unimpaired.

C. S—, æt. 70, a wasted, weakly man, had his arm run over. The olecranon was fractured, and there was a large lacerated wound of the skin, but at first we could not make out that there was any opening into the joint. I did not think that the patient was likely to survive his injury long, for he had a considerable contused wound of the leg also. However he rallied well. Suppuration of the elbow-joint ensued, and on the thirtieth day after the injury I excised the joint. He died eighteen days later of febrile marasmus.

Herr B—, æt. 39. This patient while in a state of delirium from typhus fever, sprang out of the third floor of a hospital on to the pavement. He sustained simple fracture of both calcanea, in addition to a compound fracture of the lower end of the left humerus extending into the joint. The patient was in such a weak state that I did not venture at once upon primary resection. Twelve days after the injury I performed excision, for there was suppuration in the joint and from the contused wounds : the operation was followed by rigors and extensive suppuration about the elbow. Six days after the excision I amputated the humerus. The patient died two days later—twenty days after the injury—of pyæmia.

H. B—, æt. 48, fell from a ladder and fractured both condyles of the humerus. There was extensive extravasation of blood and a very small wound close to the olecranon. His limb was put in a plaster-of-Paris splint in which a window was cut, and ice applied. Suppuration of the joint followed, and he died of septicæmia, nine days after the injury.

Herr E—, æt. 60, a very fat, big man, not exactly a drunkard, but still, a regular frequenter of the beerhouse, fell from a step-ladder, pitching backwards with the whole weight of his body on to the flexed elbow-joint. The condyles and the olecranon were comminuted. Excision of the joint was performed the day after the injury. Death from septicæmia seven days later.

R. G—, æt. 25, received a wound of the elbow-joint from a circular saw, which penetrated into the internal condyle. The joint was excised a few hours after the accident. Death took place from pyæmia twenty-six days later.

E. B—, æt. 28, received a wound of the right elbow-joint and an injury to the olecranon from a chaff-cutting machine. Primary resection of the joint was performed. The patient was discharged in four months with the wound healed; passive movement was almost normal, but the active movement was only slight. I could not find out the ultimate result of the case as regards movement.

The results of conservative and operative treatment for wound of the elbow-joint appeared to me almost equally unfavourable. Including three cases of simple penetrating wound of the joint, one of which was treated by excision the fourteenth day after the injury and recovered, two by expectant means (one recovered and one died of pyæmia), and two cases of compound dislocation, both of whom died of pyæmia (one after amputation), we have altogether eleven cases, of whom three only recovered after resection. Still, we must take into consideration that the fatal cases included a number of old people in whom the prognosis is always bad.

SECTION B. ACUTE AND CHRONIC INFLAMMATIONS.—*Acute non-traumatic inflammations—general remarks. Case of acute rheumatic disease of wrist. Case of acute osteomyelitis. Necrosis of the bones of the upper extremity. Ganglion. Cases of teno-synovitis—treatment. Case of onychogryphosis. Chronic malignant onychia. Case of elephantiasis. Case of syphilitic ulceration. Doubtful case of gangrene of fingers. Gangrene of puerperal origin. Case of chronic periostitis. Chronic disease of shoulder and elbow-joints. Remarks on excision. Arthritis deformans. Disease of shoulder-joint—excision. Subperiosteal excision of elbow. Case of reproduction of elbow-joint after excision. Ankylosis of elbow; treatment. Case of hydrops of the elbow-joint. Chronic disease of the wrist-joint. Case of excision of wrist.*

ACUTE NON-TRAUMATIC INFLAMMATIONS.

In tabulating my cases for sixteen years, between 1860–76, I entered a great many under the above heading. To all appearance they originated spontaneously, but I have not the slightest doubt that injuries—though possibly very insignificant—give rise to the infection and inflammation. Most of the "spontaneously arising" whitlows start from some slight, neglected graze or puncture or crack on the finger; as a rule, they lead only to purely local inflammation of the part, but sometimes to extensive inflammation of the lymphatics. In the majority of cases resolution follows; but occasionally the infective material remains stored up in the cubital or axillary glands, and abscesses form later on (see a case quoted in 'Billroth's Path.,' Hackleys' Transl., p. 330). At the commencement of the disease, patients do not take care of themselves, and constantly, notwithstanding the pain, go on with their work while there is considerable swelling of the limb. Thus, the extension of inflammation is favoured, and the infectious phlogogenous material extends up the lymphatics, especially the large supra-fascial lymph-sinuses. Inflammation in the hollow of the hand is especially prone to cause great swelling, and often without

any irritation leads to acute inflammation. Acute spontaneous osteomyelitis is rarely seen in the upper extremity, except in the terminal phalanges (panaritium periostale); monarticular rheumatic inflammation too, is of rare occurrence in the upper extremity. In metastatic inflammations of the joints, I have not infrequently seen the lymphatics inflamed, and distinct, localised, erysipelatous redness of the skin over the affected parts. From this I conclude that these periarticular inflammations of the cellular tissue are due to infective material passing out from the synovial membrane, into the lymphatic vessels. In the same way, I explain the periarticular inflammation which is met with in acute rheumatic inflammations of the joints, and in acute gout. In the latter disease, everybody considers now that there is for the time being, a deposit of urates in the joint, and we may not unreasonably suppose, therefore, that acute rheumatic inflammation of a joint, and acute spontaneous osteomyelitis are due to the deposit of some infectious material. It seems to me somewhat premature to attempt invariably to refer all acute inflammations to the same causes of origin. Much more collateral proof is required than hitherto it has been possible to adduce, and after all, we ought not too blindly to be carried away by this hypothesis of infection.

Acute inflammation of the wrist-joint.

A woman, æt. 59, stated that her right hand had swollen, and that all the movements had been very painful for eight days before admission. When I saw her, I fancied that the case was simply one of phlegmonous inflammation, possibly accompanied by inflammation of the sheath of the tendons. The part was painted with strong tincture of iodine, and ice applied. The disease, however, increased rapidly in severity; the right shoulder and the right elbow became affected, and finally, owing to suppuration and disorganisation of the wrist, amputation was resorted to; the patient died of pyæmia thirty-six days after the commencement of the disease.

I think in this case the disease was most probably very acute polyarticular rheumatism.

Necrosis of humerus, acute osteomyelitis.

Carl K—, æt. 16, was admitted in December, 1869; he had suffered from hip disease for four years, which had gone on to suppuration and ankylosis.

Three years previously, a swelling the size of a fist, formed in the left axilla and opened spontaneously. Over the insertion of the deltoid, was a sinus, at the bottom of which the probe came down upon hard, exposed bone. Passive movement of the shoulder was free enough, but the active movements were impaired. The sinus was laid open, and the cloaca enlarged with the chisel. Instead of the usual sequestrum in the humerus, it was found that the internal layer of bone turned towards the medullary cavity was exposed to the extent of about 8 centimètres. A counter-opening was made in the axilla, and a loose sequestrum, 3 centimètres in length, removed. For ten days he went on well, but then rigors occurred, the precursors of acute osteomyelitis of the humerus. A fortnight later I resected the upper half of the humerus; the shoulder-joint was uninvolved, but the section of the humerus showed unhealthy suppuration. Evidement of the suppurating medullary cavity was performed with the raspatory. The patient never rallied, and died five days later. At the post mortem we found abscesses in the lungs and double pleurisy.

Necrosis of the Bones of the Upper Extremity.

Suppuration and the formation of sequestra in the upper extremity is far more rarely followed by albuminuria than in the lower limb, and the disease is, on that account, far less dangerous to life—even though a long time should elapse before the sequestrum should be removed. Osteomyelitis, in many cases was the result of typhus, or was attributed to that disease; in other instances some injury was the primary cause.

Ganglion. (Z. B.)

Six cases of ordinary ganglion on the dorsal aspect of the wrist came under treatment. In none of them did a forcible blow effect cure; in five of the cases I employed puncture and subcutaneous discission, and obtained permanent cure in all instances without any serious inflammatory symptoms. In one I used forcible compression, that is to say, a padded wooden splint was placed under the wrist, and strips of plaster were drawn tightly over the ganglion and the splint. The hand swelled up, and the ganglion became painful, but disappeared completely after the strapping had been applied a few times. After eight days it again became perceptible and was then again got rid of by compression. The patient then left the hospital and I could not find out any-

thing further about her. In another case compression failed completely.

At Vienna the cases of this disease met with were seen only among the out-patients and in my private practice. I either ruptured the ganglia by pressure, or employed subcutaneous discission. No doubt the condition often returns if the former method be employed, even when pressure is kept up for a long time by a plate of lead and strict rest of the part is enjoined, but the patients, as a rule, prefer the slighter proceeding to puncture or incision. I never saw recurrence of the disease after subcutaneous discission.

Curiously enough, no case of compound palmar ganglion has ever come under my care in Vienna, and I can only remember to have seen two such cases since I have been here.

Tenosynovitis.

A gentleman came to me who had had for many years a fluctuating swelling the size of a goose-egg an inch and a half above the wrist-joint on the dorsal aspect of the forearm. He experienced some inconvenience from the swelling in writing. I first tried to cure it by forcible pressure, but without success; I then punctured the tumour with a trochar. Some perfectly clear, jelly-like matter was pressed out; I threw in some iodine diluted with an equal amount of water and allowed the mixture to remain a short time before withdrawing it again. The arm was put up on a splint, with wet bandages. Tolerably severe swelling of the arm, accompanied by fever took place during the next few days; under the application of ice, the swelling subsided in eight days, and in the course of the next three weeks it had entirely disappeared. The opening of puncture healed by first intention.

Compound palmar ganglion. (Z. B.)

E. A—, æt. 26, a turner, stated that he had noticed five years previously a painful swelling in the palm of the hand, which gradually increased until the functions of the fingers became so interfered with, that complete extension (except of the thumb) was no longer possible. The patient was in a great state of alarm lest the trouble should get still worse, and was very anxious to have something done. A fluctuating swelling could be felt in the hollow part of the hand, close above the annular ligament. The fluid could be pressed from one part to the other. I punctured the swelling with a medium-sized trochar in the hand, and with difficulty evacuated some colloid, sago-like pulp. Finding, however, that the contents of the swelling were too

thick to escape readily, I substituted a large cannula and let out a tumbler full of colloidal matter and numerous melon seed bodies. The cyst was then washed out with lukewarm water, iodine injected, and a bandage applied as in the first case. The puncture during the first few days seemed as though it would heal by first intention, but twelve days after the operation great swelling came on, and as the application of ice did not prevent suppuration, I was forced to make some counter openings. The suppuration was, however, never very great, and after a couple of months the man got well. He came back to me four years later with a report that he could use the hand well in his occupation, and had no pain. On moving the hand it could be seen that the tendons were in part united to their sheaths. The third finger could not be more than semi-flexed, but this movement was perfect in all the others. He could also extend the fingers almost completely.

In the case of a young woman in whom very much the same condition of things existed I was forced to make an incision into the swelling before the contents could be evacuated; no iodine was injected. The suppuration lasted over five months, but the ultimate result was much the same as in the previous case. So far as I know recovery was permanent.

Although the ultimate result in these cases was not bad, yet I must admit that I am rather loth to adopt any operative measures in these large palmar ganglia. The extent and severity of the inflammation of the tendon-sheath can neither be gauged with accuracy beforehand, nor controlled with certainty after it has been excited artificially. My advice is, therefore, to operate only on cases in which the loss of function is so great that it outweighs the possible danger of operation.

Onychogryphosis.

A woman, æt. 20, of strong constitution, was admitted on account of an affection of all the nails of both hands and feet from which she had suffered for three years. The lamellæ of the nails were thickened, opaque and looser than natural, and projected over the finger tips like claws. A younger brother of the patient had suffered also from the same affection since his seventeenth year. Nothing of the sort existed in the parents. Minute examination showed that the nail was healthy up to the so-called nail furrow, but half a line beyond this was diseased. The cause of the affection therefore must have existed in that part of the matrix which lay below the surface of the nail. Repeated attempts were made to discover some fungus but invariably without success. All kinds of applications were tried: the nails were cut away in great part, or scraped down from the upper surface; nothing, however, seemed to do any good, and after three months the patient

was discharged unimproved. I saw her three years afterwards and no alteration had taken place in her condition.

Chronic Malignant Onychia.

This disease as we see it, almost invariably occurs in children, and commences with slight inflammation about the matrix of the nail. Instead of healing, it gradually goes on to slowly progressing ulceration, either beneath or in the neighbourhood of the nail, and is accompanied by great swelling, redness, and pain. It appears probable that the malignant character of the affection is due essentially to neglect of the small wound at the outset. The slow progress of the disease results from the difficulty in getting rid of the poisonous agent (perhaps very minute organisms which have become charged with infective material). The chronic course of the disease, and sometimes its very appearance, cause it to resemble strongly syphilitic ulceration of the finger. Onychia maligna, too, has many points of similarity to diphtheritic ulceration, and I am not entirely averse to considering the affection as a peculiar kind of diphtheritic ulceration; it should be, however, remarked, that onychia maligna is never phagedænic and that hardly any of the diseased parts are lost. In this respect, therefore, it has no relationship with other forms of diphtheritic inflammations of wounds, least of all with hospital gangrene, notwithstanding that externally the processes seem to be so similar.

The disease frequently originates spontaneously, perhaps from some unnoticed excoriation or little fissure about the nail. In one of my cases, the disease was supposed to have originated from a blow on the finger with a schoolmaster's cane a year previously.

Vanzetti, in his classical work on this disease, has pointed out to us an excellent remedy; this consists of powdered nitrate of lead, which should be dusted over the finger, and kept in position with a dry bandage and strapping. In from five to ten days the dressing should be removed, and a crust will then probably separate, exposing a healthy, granulating surface, which will usually heal under some simple dressing. The newly-formed nail is commonly irregular at first, but in course of time resumes its natural shape.

Elephantiasis of the arm. (*Chronic indurated œdema.*)

A strong young man, æt. 23, was admitted with this affection. When about 12 years old he suffered from chronic ophthalmia and suppurating glands in the neck. Then he had some suppuration about the right forearm, which was a long time in healing. Some swelling and thickening was left about the forearm, which never completely disappeared. It did not occasion him any serious inconvenience or hinder him from working. From time to time, however, without any obvious cause, he had attacks of erysipelas, which usually extended up to the shoulder. He got well in a few days, but after every such attack the arm increased in size. He was suffering from one of these erysipelatous attacks on admission. By suspending the limb and careful bandaging, the size of the arm was materially diminished, but the improvement did not last long, and after a time the patient left the hospital unimproved.

Such a condition is rare in the arm; probably the subcutaneous lymphatic channels had been destroyed by the old suppuration, and as no new channels could be formed, and the old ones were insufficient to supply their loss by collateral dilatation, the chronic, indurated œdema was set up. The veins in the affected arm were not dilated.

Syphilitic ulceration of the arm.

A woman, æt. 40, came under my care who had suffered from syphilitic symptoms for about twelve years. About twelve years previously ulceration began on the forehead, scalp, integuments of the breast, and over the right hand and arm. She had been frequently under treatment with iodide of potassium, but I could not discover whether she had had a mercurial course. When admitted the ulceration—save on the arm and the dorsal surface of the hand—was for the most part healed, but in these parts it appeared to have progressed unchecked. On the dorsum of the hand the tissues were so deeply destroyed that the fourth and fifth metacarpal bones and their articulations were completely exposed. From the depth of the ulceration around it was evident that total gangrene of the fingers must inevitably ensue. Above the middle of the forearm there was no actual ulceration. At the patient's express wish amputation was performed here, but she died of pyæmia. Excepting a cicatrix of the liver the internal organs were found to be free from syphilitic disease.

Gangrene of the fingers.

J. M—, æt. 56, a labourer, strongly built, but very unintellectual,

came under my care at Zürich. He stated that up to eight days before admission he had been perfectly well, but that then the tips of all his fingers became simultaneously swollen and painful, and scabs formed on them. On the tips of all the fingers we found very firmly-attached scabs and crusts, which on minute investigation proved to be small mummified portions of skin. In addition to this, on several of the fingers, close to the mummified parts, dark blue patches, like extravasations of blood, were seen beneath the epidermis. Wet compresses were applied to the hand. Twelve days later he was attacked with trismus and subsequently with tetanus, of which he died. Nothing abnormal was found in the brain or the membranes of the brain at the post mortem. The aorta was highly atheromatous, and the radial and ulnar arteries considerably thickened. The rest of the body was perfectly natural.

Could this have been a case of ergotism? No history of the sort could be made out. Was it a case of senile gangrene of the fingers, or one in which tetanus accidentally supervened? I am unable to decide the point; the less so that the digital arteries were not examined.[1]

Spontaneous gangrene of the forearm of puerperal origin.

I have, unfortunately, only a brief record of this remarkable case.

Frau V—, æt. 35, who had previously been a strong, healthy woman, was in the ninth month of pregnancy when the disease commenced. Seventeen days before her admission, she felt pain in the left hand, for which no cause could be assigned. Two days later the entire upper extremity was greatly swollen up to the axilla. Four days after the commencement of the pain, she had a normal and easy confinement. Three days later, the fingers turned blue and then black. The gangrene then spread rapidly up the forearm.

The patient had a long journey up to the hospital, and when admitted, I found the left hand, and two thirds of the forearm black and dry; the skin was leathery and emphysematous. A distinct line of demarcation was seen, which ran round the dorsal aspect in a circular form, and on the volar side a pointed tongue of healthy tissue ran downwards for about half the length of the forearm (like the flap seen on the calf in gangrene from embolism of the popliteal artery.) On the inner side of the upper arm, the tissues of the lower part were infiltrated and reddened, and fluctuation was distinct. The lungs were healthy. There was some sanious discharge from the vagina; the uterus was contracted, the os externum patent, and the portio vaginalis

[1] Compare Mr. Thomas Smith's case of gangrene of the hand in a child, published in the 'Clin. Soc. Trans.,' vol. xiii, p. 196. [Ed.]

relaxed and tender. Amputation was performed about the middle of the arm, and an abscess which reached up almost to the axilla laid open. Complete recovery followed in a month.

With regard to the examination of the arm, I find it only recorded "no thrombosis of the brachial artery or veins, either in the stump or at the amputated portion." This I can hardly believe, for thrombi must undoubtedly have been found at the line of demarcation. I regret that I did not see the case myself, for it occurred during my vacation. From the description of the commencement of the disease, and from the position of the line of demarcation, I suspect—reasoning by analogy from similar cases of spontaneous gangrene occurring in the lower extremities—that there was an embolism of the cubital artery, probably originating from endocarditis with vegetation growths on the aortic valves.

An analogous case also originating during pregnancy, of spontaneous gangrene of the leg, came under my observation at Zürich (*vide* infra in the chapter on the lower extremity).

Chronic periostitis of the bones of the forearm.

A child, æt. 8, was admitted with a swelling of both forearms and pathological dislocation of the right hip. It was not possible to find out much beyond the fact that though rather neglected he had been fairly healthy up to two years previously; the right hip-joint then became affected and painful. The thigh could be freely moved without causing pain. Both forearms we found much swollen, owing to marked deposits of new bone, especially on the ulna, so that these bones, particularly at the upper parts, were twice their normal thickness. This osteoplastic periostitis was suggestive of congenital syphilis. Iodine was applied to the forearm, and iodide of iron was given internally. A fortnight after admission the child became very ill, with pain in the abdomen, and violent vomiting; during the next few days the abdomen became distended, and the sickness continued. Eighteen days later fifty ounces of thick yellow pus escaped at the umbilicus. The next day the child was taken away by his mother—a rather obstinate woman—against advice. The child was in such a wretched plight that I thought he would soon die; I heard, however, twelve months later that he was still alive, though in a very deplorable condition.

Chronic Inflammation of the Shoulder and Elbow Joints.

A table of nine cases—in three of which excision was performed

—will be found in the 'Bericht' for 1860–67, p. 426, and a table of thirty cases of chronic inflammation of the elbow, on pp. 430 *et seq.*

Excision was practised in fourteen cases and amputation in one, (op. cit., p. 430). While I was at Zürich none of the patients on whom excision of the elbow-joint was performed for disease died. I operated always according to von. Langenbeck's method. The ultimate utility of the arm in the great majority of cases left nothing to be desired. True, the parts sometimes did not altogether heal up for a year or more, but after complete excision, small, slightly discharging sinuses interfere but little with the utility of the limb. The time that these sinuses take to close, depends materially upon the condition of the soft parts at the time of excision; sometimes chronic periostitis of the joint ends ensues, giving rise to fresh sinuses. Such a condition is, however, rare, and will only occur in persons of very weak constitution.

The utility of the false joint after excision depends very much upon the condition of the muscular system of the patient, especially the muscles of the diseased arm. I have always practised total excision, and have never seen a useless flail-like limb result. However, the laxity of the joint will be found far greater in from two to three years after the excision than might be expected when the patients are discharged from six to eight months after operation. The latter is just the period when the results of operation seem to be most favourable; it is, therefore, important to avoid removing more of the articular ends than is absolutely necessary, nor should passive movement be commenced too early. In cases where the movements at an early period—say eight or ten weeks—are very free, it will be better to limit them by means of a hinged splint.

(W. B.)

Between 1860–76, fourteen cases of chronic fungous inflammation of the shoulder-joint, most of which were associated with external caries and suppuration, came under treatment. Eight of these were in women and six in men. The joint was excised in four instances; one only recovered with an exceedingly good and useful arm. Septicæmia proved fatal in one instance, and two of the patients

died of phthisis sixteen months and four years respectively after the operation.

Chronic Diseases of the Joints of the Upper Extremity.

In tabulating these cases I excepted superficial ulcerations, chronic hydrops of the joints, chronic rheumatic diseases, slight cases of synovitis, and cases of necrosis, as well as those in which ankylosis resulted. I find thus, that between 1860–76, 231 cases came under treatment, 134 of whom were men and 97 women. These figures may be partly explained by the fact that in Vienna, as also in Zürich, more beds were set apart for males; but on the whole the numbers give a good general idea of the proportionate prevalence of these diseases in the two sexes. These figures are the more striking when we consider that my statistics show that caries of the shoulder and of the elbow-joint more frequently occurs in females. I can hardly account for this, unless on the supposition that severe arm work is more injurious in the female than in the male sex.

The different parts of the upper extremity are diseased in very different numerical proportions; thus, out of my whole list of cases (231) the scapula was affected only in four cases, and the clavicle but once; while the arm, and the elbow downwards inclusive, were affected in no less than 199 instances. The elbow-joint is the part most frequently diseased, probably because it is more exposed to injury, and perhaps also in part because the growth of bone here is greatest, and the disease—as my tables show—generally attacks individuals in whom bony growth is going on actively.

Poly-articular Chronic Rheumatic Affection of the Joints (Arthritis deformans).

Of six cases of this disease, the shoulder-joint was principally affected in two, the wrist in two, the elbow-joint in one, while in one the finger-joints were chiefly involved. All these patients were recommended thermal baths.

Inflammation of the shoulder-joint.

The following case is worthy of mention on account of the

duration of pyæmia and the fact that I was compelled to resort to resection:

A man, æt. 56, but very strong, was admitted on account of a lacerated wound of the hand. At first all went on well, the gangrenous parts separated, and the wound began to granulate. Sixteen days after the injury, however, the patient was attacked with diarrhœa; this was controlled by opium, but he lost strength, and had remittent attacks of fever. A month later a painful infiltration was noticed on the inner side of the injured extremity, at which spot an abscess subsequently formed; then the shoulder-joint became affected and painful. The patient had no rigors, but was weak, with marked fever in the evenings; free suppuration occurred from the abscess, which was found to be connected with the shoulder-joint; meanwhile the wound of the hand healed up perfectly. As the suppuration seemed to be draining the man's strength, and all the internal organs were healthy, I determined on resection of the humerus. The removal of the carious bone exercised no check on the disease, and he died of marasmus.

The commencement of the pyæmia here dated in all probability from the attack of diarrhœa—at all events, gradual decline set in from that time. This was four months before he died, so that we may look on the case as one of chronic pyæmia, although many surgeons are unwilling to admit the occurrence of such a disease.

Resection of the elbow.

In a well-nourished child, æt. 14, who had had disease of the elbow for six years, originating without known cause, I partially excised the joint, *i.e.* I removed with the knife only the carious portions of the trochlea and the olecranon, together with a small part of the condyle of the humerus. The parts healed up, but complete ankylosis followed. This was forcibly broken down under anæsthetics, but considerable reaction invariably followed, and the ankylosis returned as before. I then resected the joint again, removing the end of the humerus subperiosteally, with a satisfactory result.

Reproduction of elbow-joint after excision.

Leopoldine O—, æt. 13, an ill-nourished child, was admitted with caries of the right elbow-joint, of three years standing. When admitted, she had but recently recovered from an attack of variola, followed by one of typhus. The joint was completely excised; the wound did exceedingly well, and her general condition rapidly improved at first; subsequently, however, cold

abscesses formed in the subcutaneous cellular tissue in various parts of the body, which much reduced her strength, and she was brought still lower by inflammation of the right knee-joint and periostitis of the left external malleolus. The latter did not proceed beyond the stage of infiltration, but an immense abscess formed about the right knee-joint, which was allowed to open spontaneously and then drained; six months afterwards the abscess was still open, and the joint itself was swollen, and tender on pressure. The excised elbow had completely healed, but active movement, both of flexion and extension, was very slight; the muscles were much atrophied. Eventually the knee-joint recovered without any impairment of mobility and the patient was able to walk without limping. Some sinuses were still open about the calf, but did not communicate with the joint. The excised elbow two years later, as far as utility was concerned, was in no way inferior to a normal joint, save only that pro- and supination were limited. Three years after the excision, the patient was attacked rather suddenly with suppuration of the knee-joint, and died shortly after of caseous pneumonia. Post mortem: the liver, spleen and kidneys were found to be lardaceous. On examining the resected elbow, a perfect ginglymus was found and a very complete joint had been reproduced.[1]

Ankylosis of the Elbow-Joint following Chronic Rheumatism.

In two cases that came under my care, the ankylosis was partial, and a slight amount of flexion and extension was permitted. Under an anæsthetic the movements were rendered perfectly free by forcibly breaking down some adhesions, but in neither case was any increased power of movement eventually obtained, nor was the utility of the limb improved. Daily passive movement in such cases is so painful, and followed so constantly by swelling of the part, that the sufferers soon lose patience. Where there is still a certain amount of movement matters can be somewhat improved by orthopædic and gymnastic treatment, if persevered in for some years. When the inflammatory process has lasted for some years, and is followed by complete immobility of the joint, we may consider ourselves—and the patients—fortunate, if the disease terminates in ankylosis; nothing better can be hoped for in such cases. Sometimes, it is true, caries takes place with partial bony ankylosis; in such cases I

[1] This case is more fully described by Dr. von Czerny in the 'Arch. für Klin. Chir.,' Bd. xiii, 1. Compare Mr. Syme's case recorded and figured in the 'Lancet' vol. 1, 1855, and described in Holmes's 'Principles and Practice of Surgery,' p. 896, 1st edition. [Ed.]

usually content myself with correcting the deformed position under an anæsthetic. Most of the patients came up with the arm ankylosed at a very obtuse angle; by bending it to a right angle the limb is rendered far more useful. The limb was always put up in a plaster bandage. I never found it necessary to repeat the process more than once. If any severe pain followed the rédressement an ice-bladder was kept on the part, but it was rarely found necessary to continue this application for any length of time. In one instance only (a young girl) a rather acute abscess developed beneath the bandage, over the external condyle; the plaster case was removed, and a quantity of foul pus let out by an incision. The pus was found to contain a great number of strepto-cocci. Uninterrupted recovery followed.

In another case I found myself unable to flex the limb to a proper position under chloroform. Suspecting that the difficulty was due to bony union of the olecranon and the trochlea, I cut down on the olecranon and separated it. I was then able to flex the limb, but suppuration followed and the ankylosis was not complete for ten weeks.

Hydrops of the elbow-joint. (*Hydrops herniæ synovialis*).

A man, æt. 21, came under my care with the history that his previous health had always been good, but that for about three months he had been unable to extend his left arm completely, and found that this limb soon became tired when he was at work: at the same time he noticed a slightly painful swelling beneath the skin, on the outer side of the elbow-joint. When admitted, we found a subcutaneous swelling, the size of a walnut, firmly attached close above the external condyle of the left humerus. I suspected that the tumour was a ganglion connected with the joint, and accordingly discountenanced operation. The patient however, was anxious to have something done, as the condition of the arm interfered with his work. I punctured the swelling, and let out some colloid matter, containing fibrinous melon-seed bodies. The puncture soon closed, and the fluid collected again, so that a month or two later I performed subcutaneous discission with a tenotomy knife. The fluid again collected, but unfortunately the whole joint became painful. Subacute inflammation of the entire articulation followed; the puncture again gave way, and the joint suppurated. I then performed complete excision. He left the hospital with a useful arm, but I was unable to learn the subsequent result.

Chronic Inflammation of the Wrist-joint.

A table of twenty cases—in five of which excision was performed—will be found in the 'Bericht' for 1860–67, p. 440.

All my excisions of the wrist were performed by means of two lateral incisions; none of the patients died from the operation. Out of the five cases, two only recovered completely with a tolerably useful hand; in one other the sinuses were still open, though the patient's general condition was good, four years after operation. One died four years after the operation of phthisis, and a girl, who had at the same time caries of the foot, died of marasmus two or three months after the operation. In two instances the disease of the wrist was limited to a few of the carpal bones. One of these patients recovered with ankylosis after the removal of two of the bones, and the other after the extraction of one.

Excision of the wrist.

Vincenz N—, æt. 20, was admitted with necrosis of the outer half of the second metacarpal bone, which had existed for about a year. This bone was removed, but swelling about the wrist, and eventually suppuration of the carpal joints followed. The entire carpus was then excised, and the patient left some months later with very slight swelling of the part; three sinuses still remained open, but no diseased bone could be felt.

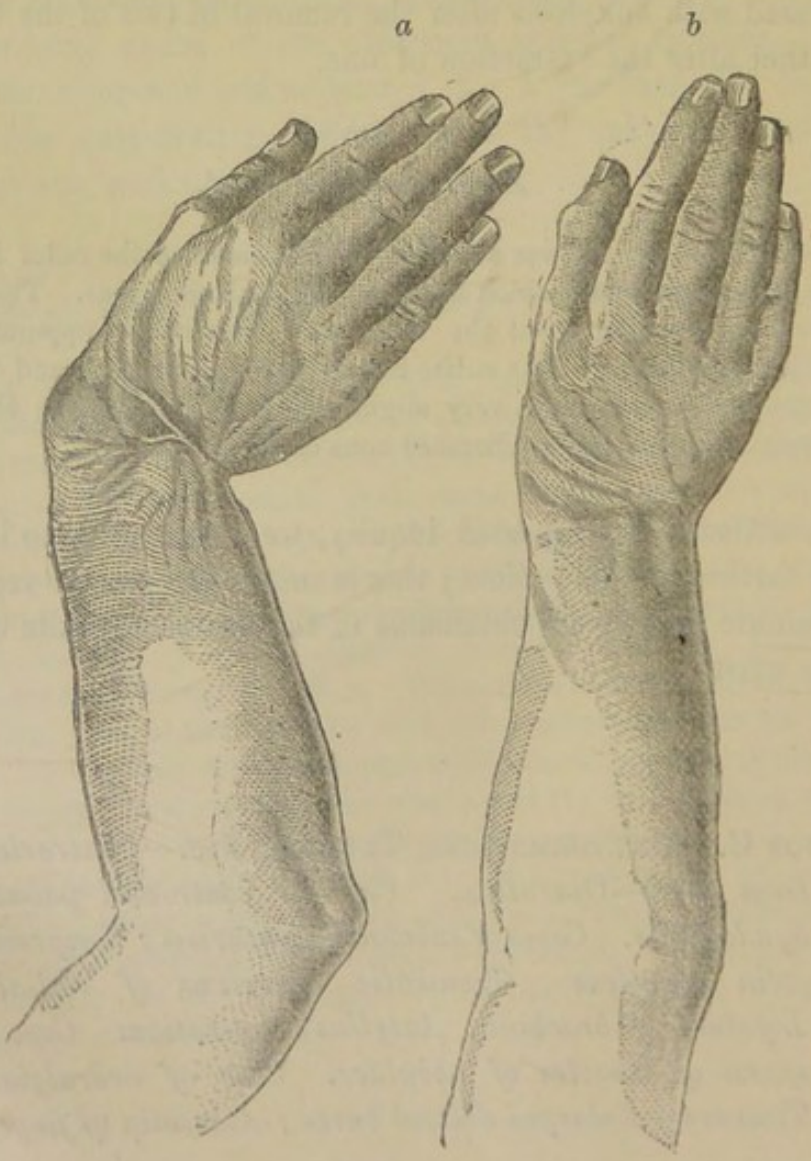
Notwithstanding repeated inquiry, we were unable to learn anything further of this patient; this is matter for greater regret, as so few minute records are obtainable of the ultimate results of excision of the wrist.

Section C. Malformations, Tumours, etc.—*Contracted cicatrix from burn—Operation. Case of contracted palmar fascia. Syndactylia. Cases of subclavian aneurism; Compression; Ergotin injections. Traumatic aneurisms of radial artery; Ligature of brachial; Antyllus's operation. Case of clonic spasm of muscles of shoulder. Case of neuralgia. Simple Tumours—Enlarged deltoid bursa; Atheroma of finger; Caver-*

nous lymphangioma; Enchondroma; Cicatricial fibroma of palm of hand; Neuro-fibroma of the musculo-spiral nerve; Osteoma. Malignant Tumours—Sarcoma (small-celled) of deltoid; Alveolar sarcoma of humerus; Sarcoma of hand; Lympho-sarcoma treated by injection of albuminate of mercury; Granulation sarcoma; Spindle-celled sarcoma; Osteo-sarcoma of clavicle—Removal; Osteo-sarcoma of humerus; Central osteo-sarcoma of ulna; Epithelial carcinoma originating in the wound of an issue.

Contracted cicatrix after burn.

FIG 18.—(*a*) DEFORMITY OF HAND THE RESULT OF CONTRACTED CICATRIX; (*b*) THE SAME AFTER RESECTION OF A PORTION OF THE RADIUS.



Kaspar L—, æt. 17, was severely burned about the right wrist when two years of age; the wound, which was deep and extensive, took two months to cicatrise. As the contraction of the cicatrix was strongest on the dorsum of the wrist-joint the hand became strongly abducted and bent over to the ulnar side. (See Fig. 18 *a*.) The patient, whose health was good, was seriously inconvenienced in his work through this deformity, so that it became highly important to correct it if possible. It appeared that the ulna, pressed upon by the cicatrix, had not kept pace in growth with the radius; the latter bone was markedly curved; flexion and extension at the wrist-joint were normal; adduction and abduction somewhat interfered with, while scarcely any pro- and supination was permitted. The deformed position of the hand was his chief trouble.

It would have been of no use in this case to stretch the cicatrix, on account of the oblique position of the radial articular surface at the wrist; it appeared to me better to shorten the radius, which was relatively too long. Accordingly I removed with the saw a piece of this bone 4·5 centimètres in length, taking it from the lower curved part of bone, and preserving the periosteum. The limb was put in a plaster-of-Paris bandage with a window. When the patient was discharged three months later, the position of the hand was as shown in the illustration Fig. 18 *b*. He could write and do light work, but there was still a certain amount of stiffness in the movements of the hand; the union of the radius was perfectly solid.

Contraction of the palmar fascia.

A dyer, æt. 58, came under my care, for constantly increasing contraction of the palmar fascia, from which he had been suffering for two years. The tense bands were divided as far as possible, subcutaneously. After the operation, the fingers could be completely extended; the hand was bound to a splint, but considerable suppuration followed, which lasted three months, and when it ceased the condition of the hand was no better than before. No further attempts were made to effect a cure.

Malformations. Syndactylia.

A child, æt. 6, was admitted with a curious deformity of the hand. On the right hand there were only four metacarpal bones. At the end of the fourth the pulp of the finger was well developed on the volar side, but below, the bone was somewhat broader than normal. Attached to its head were the two first phalanges, which were connected to each other by bone; at their bases they diverged from each other at about an angle of 80°. All the first phalanges were connected by a web of skin, and on each of the two first was a well-developed middle and distal phalanx which were very little

separated from each other and resembled somewhat the claws of a crab. The fourth finger was removed, after the attachment at the base had been cut through with the bone forceps.

Aneurism of the subclavian artery, treated by compression.

K. F—, æt. 34, three weeks previously had struck his right shoulder in a fall; a week later, he noticed a swelling about the left clavicle, which increased gradually. On admission he had pain in the left arm, and numbness of the fingers. The swelling was of the size of a hen's egg. Digital compression was tried, and also pressure, with a specially constructed apparatus, but in five weeks' time, there was no appreciable improvement, and the patient left the hospital uncured.

Subclavian aneurism. Ergotin injections.

A man, æt. 56, came under my care, who, three years previously, without known cause, had noticed darting pains in the right arm, with formication and numbness of the fingers, but the symptoms were not sufficiently severe to prevent him from following his employment. Six months before I saw him, the symptoms became more marked, and a medical man detected a pulsating tumour above the clavicle. Eight days before admission he had a severe attack of dyspnœa. When admitted, I found an aneurism of the right subclavian artery, the size of the fist. As operative proceedings seemed inadvisable, I employed subcutaneous injection of ergotin over the aneurism, as recommended by von Langenbeck. No improvement took place under this treatment; the growth increased, the attacks of dyspnœa became more frequent, the voice hoarse, and he died of marasmus, a month after admission.

Traumatic aneurism of the radial artery. Ligature of the brachial.

A smith, æt. 40, was admitted with the following history:—Fifteen days previously, a large splinter flew off from a heavy iron hammer, and struck him on the flexor side of the right forearm. Immediately, a jet of blood spurted from the wound, according to the patient's rather hyperbolical account, to a height of six feet. He pressed a coin upon the wound, and placed the arm in cold water. A surgeon applied a bandage and sent him home. The bleeding soon recurred, and during the next fortnight occurred on an average twice daily. The quantity of blood lost was estimated by the patient at several pints, and must undoubtedly have been very considerable; the slightest movement—an attack of coughing for instance—was sufficient to bring on the hæmorrhage again, and the man had fainted several times from loss of blood. The forearm became considerably swollen on the day of

the injury, and during the next twenty-four hours the swelling extended to the hand and upper arm.

On his admission, the entire upper extremity was much swollen, from the fingers to the axilla; the upper arm was rigid, œdematous and of a yellowish colour. The hand and the flexor aspect of the forearm were exceedingly swollen and tense; sensation was partly lost in the hand, and completely absent in the thumb. About the middle of the forearm, on the flexor aspect, was an irregular gaping wound an inch in length, from which coagula protruded. The hæmorrhage occurred again during examination. While an assistant compressed the brachial artery, I passed my finger through the wound into the aneurismal sac, and laid open, with a probe-pointed bistoury, all the soft parts, up to the end of the sac, *i.e.* to a little above the elbow-joint. The superficial wall of the cavity was composed of the skin and the fascia. At the bend of the elbow, the median vein was cut through, and required ligature at both ends. On turning out all the coagula, the radial artery was seen completely torn through about its centre, and lying bare, as if it had been dissected out. Considering that this vessel had been torn fifteen days previously, and was so extensively exposed, I was unwilling to trust to a double ligature, and therefore secured the brachial artery at the upper angle of the wound, about half an inch above its bifurcation; hæmorrhage, however, still occurred from the radial artery, and I was compelled therefore to tie it at the point of injury. No further bleeding took place; within a few hours, the swelling of the hand and forearm materially diminished, and a day or two later movement and sensation returned in the fingers. The man recovered in fifteen days.

Aneurism of the radial artery.

A woman, æt. 29, was admitted, who six weeks previously had received a wound on the flexor aspect of the forearm, close to the wrist. The wound soon healed up, but a few days before admission, swelling occurred about the cicatrix, which eventually gave way, and severe hæmorrhage occurred. Antyllus's operation was performed, and the patient recovered.

An exactly similar case occurred in a boy, æt. 16, in whom a pulsating tumour formed in the cicatrix, four weeks after the injury.[1]

Clonic spasm of the muscles of the shoulder-joint.

Heinrich K—, æt. 8; four weeks previously, without any known reason, he had noticed a kind of throbbing and beating sensation in the right shoulder. The outer border and articular portion of the scapula, were spas-

[1] Some remarks on the treatment, etc., of aneurism will be found below in the chapter on the lower extremity. [Ed.]

modically drawn back about fifty times per minute, the movement being accompanied by a faintly audible cracking noise. The serratus magnus muscle appeared chiefly affected, but no reason could be discovered for the spasm. We had not an opportunity of studying this choraic-like movement for very long, for the spasms suddenly disappeared one day after the arm had been forcibly raised for some time, for the purpose of examination. The spasms did not return during the next three days, and the patient was then discharged.

Neuralgia.

Herr H—, a Russian, æt. 30, came under my treatment in 1875. He informed me that, about six years previously, from no known cause, he had severe pain from time to time at a certain point on the right little finger; the spot was very sensitive when touched, and the pain extended up the arm from it. Two years before, Pirogoff had excised the painful part of skin together with a portion of the matrix of the nail. The wound healed up, but the symptoms were unrelieved except that the shooting sensations did not extend up the arm when the cicatrix was touched. By means of an incision over the first phalanx, I excised a portion of the volar branches of the ulnar and radial nerve a centimètre and a half in length. The effect of this was to limit the loss of sensation to the affected part. When he left, ten days after the operation, he was free from the attacks, and pressure on the cicatrix did not occasion any pain. Unfortunately, I could not succeed in learning whether the cure was a permanent one.

Enlarged deltoid bursa.

A man, æt. 17, came under treatment with a tumour, the size of a goose-egg, situated on the upper part of the left shoulder, in the deltoid muscle. Fluctuation was very distinct. No communication could be made out between the swelling and the shoulder-joint; the cyst was punctured, and some clear, highly albuminous, yellow fluid escaped, which contained a few small pale round cells. Probably this was a case of enlarged subcutaneous bursa.

Atheroma of the finger.

Herr G—, æt. 40, came to me with a small hard nodule which he had noticed for some years on the tip of his right middle finger. He attributed its origin to a wound received a long time previously from a flying splinter of a percussion cap. The tumour was about the size of a large pea, tolerably firm, and rather tender. No positive diagnosis could be made, but it was thought to be probably due to a foreign body. On laying it open sebaceous matter immediately escaped, and the walls of the growth collapsed, so that there was some difficulty in removing the whole of the adherent cyst. The

wound was stuffed with charpie for a while and then allowed to heal, but the cicatrix remained painful and a fresh tumour formed shortly afterwards and broke open the scar of the former operation. Dr. Seybert was able, some months afterwards, to draw out two small sebaceous cysts by means of a pair of forceps, without enlarging the wound.

Cavernous lymphangioma.

K. F—, æt. 17, a journeyman tailor, came under my care in 1870, for a soft, elastic growth, about the size of the fist, situated under the right deltoid muscle; the skin overlying the tumour was natural, but the growth was rather bound down by the structures over it. It had existed from his earliest childhood, and had increased gradually. The tumour was taken to be a lipoma. A few days after his admission into the hospital the growth increased in size and became tense; the skin became red, and the patient feverish. Cold was applied, and the symptoms soon subsided. I removed the tumour by two elliptical incisions. It was not invested by a capsule, but gradually became lost in the surrounding tissue, and in dissecting it out, some thin, serous fluid spurted out at several points. The morbid growth consisted of small communicating cavernous spaces, enclosing the fluid mentioned. It was found necessary to remove the fascia over the deltoid muscle. The wound was filled up with charpie soaked in tincture of iron. Recovery was complete, though somewhat retarded by an abscess which formed in the axilla.

On comparing the above case with one recorded below in the section on tumours of the lower extremity, it will be seen that in these tumours the transitory redness and inflammation, the tension of the growth, and the fever occurring without evident cause, all form valuable guides to the diagnosis. Such tumours are most easily mistaken for soft, diffused lipomata. In this case the signs, which in most blood tumours are so characteristic, were absent, viz: the compressibility and erectile properties of the growth. The respiratory movements, too, exerted no appreciable effect upon the swelling.

Enchondroma.

A. B—, æt. 44, was admitted with a tumour in the palm of the hand, which had been growing for ten years and had reached the size of a walnut. The patient was an iron turner, and the origin of the growth was attributed to pressure. The tumour was removed, and found to be situated on the sheath of one of the tendons.

A tumour, the size of a hen's egg, which had been growing for eleven years, in a man, æt. 54, was removed from the first phalanx of the right thumb. The cause of origin was the same as that of the previous case; here, also, the tumour was situated on the sheath of the tendon, and had no connection with the bone.

Enchondroma of the phalanx.

Fraulein F—, æt. 18, came to me on account of a hard nodule, which had been growing for twelve years in the first phalanx of the little finger. The growth was the size of a large hazel nut, painless, and had originated without any known cause.

I removed the tumour in the following way:—Having exposed the excrescence I separated it from the bone; the rest of the growth was then scraped away from the medullary cavity of the shaft to one side of which it was connected. About two thirds of the circumference of the phalanx were thus preserved and a hollowed-out cavity left in the bone; the sheaths of the tendons were not injured. The patient rapidly recovered. Two years later I heard that no recurrence had taken place. I adopted similar treatment in a case, some years ago, where the enchondroma also sprang from the first phalanx, and was the size of a large bean; in this case considerable suppuration followed the operation, with inflammation of the sheath of the tendons. The patient recovered with a perfectly normal finger, and no recurrence had taken place four years afterwards. These two cases illustrate, therefore, a rather important point, viz: that, under certain conditions these enchondromata are removable without amputation.

Deep-seated cicatricial fibroma of the palm of the hand.

F. G—, æt. 43, a teacher, had had some suppuration of the palm of the hand eleven years previously, which healed up without impairing the function of the part. Gradually the cicatrix became hard, thick, and rather sensitive. I removed a very dense fibroma the size of a pigeon's egg. It was of spherical shape and readily lifted out of the deep parts, as soon as the incision had been made. The hæmorrhage was very trifling. The tumour apparently was not connected with any of the nerves. The man soon recovered, and wrote a few months later to say that the hand was perfectly normal, but the sensibility of the middle finger was impaired.

Neuro-fibroma of the musculo-spiral nerve.

A tumour of this nature, the size of a bean, was removed from the arm of a man, æt. 33; he had in addition a neuro-fibroma, the size of a pea, on the internal cutaneous nerve, and two in the lower extremity; on the right side of the chest also there was a nodule, the size of a pin's head. The growths had been noticed for two years, and were all acutely sensitive. I removed the four nodules, all of which were found to be central neuro-fibromata; one of those on the leg, attached to the peroneal nerve, was the size of a bantam's egg; paralysis of this latter nerve, and of the musculo-spiral resulted from the operation. I had no opportunity subsequently of learning whether he recovered from this condition.

Osteoma. (*Exostosis bursata olecrani.*)

A man, æt. 25, was admitted with a small hard tumour of the olecranon, which he stated had existed as long as he could remember. Some time previously a second softer tumour had formed on the first; in due course it broke, and some thin yellow fluid escaped. On examining the patient, I found an exostosis, the size of a large bean, at the junction of the olecranon with the shaft of the ulna. Seated on this was a small thickened bursal sac, from which serum dripped away through a small opening. Movement in the elbow-joint caused some pain. I felt sure that the bursal sac mentioned was connected with the articulation. I laid open the bursa and removed the exostosis; suppuration of the joint followed as I had anticipated. The patient would not allow resection, and left with an ankylosed elbow.

Sarcoma of the arm.

Frau H—, æt. 55, consulted me on account of a painful swelling of the right deltoid, which had existed for eight weeks. It proved on removal to be a large-celled alveolar sarcoma.[1] The growth recurred again and again, always in the cicatrix; the axillary glands were unaffected throughout. Five years after the first operation the arm was removed at the shoulder-joint: she died a few months later, and at the post-mortem examination some fifteen or twenty soft medullary tumours were found in the lungs.

The tumour in this case was altered in microscopical character even at its first recurrence, though the change became more apparent in the succeeding growths; it then partook more of the nature of a small-celled gliomatous growth, parts only showing traces of the original appearance.

[1] Compare Billroth's 'Pathology,' Hackley's Trans., Fig. 138, p. 617. The preparation shown in the illustration was taken from this case. [Ed.]

M. F—, æt. 9, was admitted for a rapidly growing tumour which occupied the upper half of the humerus, and was the size of a child's head. The skin over the growth was thin, and the veins dilated and prominent. I supposed that it was a case of osteo-sarcoma, and amputated at the shoulder-joint. Professor Rindfleisch, however, on examination found that the growth was not such as I had imagined, and following the old nomenclature, he designated it a typical osteoid cancer (Knochen Carcinome); according to our present views I should have termed it an alveolar sarcoma. The mass of the tumour was of a pale greyish-red colour and was partly situated in the medulla of the bone, and partly on the outer surface of the partly destroyed compact tissue, of which only a layer was left.

I heard subsequently that shortly after her dismissal, recurrence took place in various parts of the body, but not at the site of operation. Towards the end of her life, severe nasal catarrh, complete obstruction of the nose, and total blindness occurred. After death tumours were found connected with the skull and brain, which on examination were seen to be beautiful specimens of small-celled sarcoma—some of the cells being round, and others spindle-shaped. I have no doubt, therefore, that the primary tumour of the humerus was a sarcoma. Unfortunately, the original specimen was lost, so that I was unable to compare the two. The disease lasted altogether twenty-two months.

Sarcoma of the hand.

F. H—, æt. 15, was admitted for a tumour in the palm of the hand, just above the wrist. The growth originated after a blow, received three years previously; it had increased very slowly, and without pain. The parents were much opposed to amputation, and accordingly I extirpated the growth. I found the tumour connected with the sheaths of the tendons and extending some little distance along them. The operation was performed antiseptically and rapid recovery followed. The movements of the hand were considerably impaired subsequently, but by persevering friction, and faradisation, the stiffness gradually improved. Recurrence took place seven months later in the cicatrix, and as amputation again was refused, I proceeded once more to dissect out the tumour. The anatomical condition was of some interest; the morbid growth extended along the sheaths of the tendons to the finger-joints, and I was forced to lay open the sheaths for a considerable extent. Under antiseptic treatment, the wound, which was extensive and complicated, did very well at the outset, but secondary hæmorrhage came on, then rigors, and inflammation of the pleura, so that amputation became necessary. He recovered from this, but died some months later. Numerous sarcomatous nodules were found in both lungs and the lymphatic glands of the right axilla were

degenerated to sarcomatous nodules. The disease altogether lasted four years and five months.

Lympho-sarcoma treated by injection of albuminate of mercury.

A boy, æt. 13, with a lympho-sarcoma, the size of an orange, in his axilla, was treated by paryenchymatous injection of albuminate of mercury. Abscesses formed, and in the course of a month the tumour was distinctly smaller, though it had not altogether disappeared.

Granulation sarcoma of the upper arm.

Jacob G—, æt. 48, was admitted in November, 1869. A year previously he had accidentally noticed a painless nodule about the size of a large pea, which gradually increased, and was removed after two months by Professor von Dumreicher. Within two weeks the tumour recurred, and gradually attained the size of a hen's egg; it was then again removed. Six weeks after this last operation he came under my care. The growth was then the size of a large fœtal head, firm, nodulated, painful, ulcerated at several points and bleeding very readily when touched. It encircled the whole upper half of the left arm, and was immovably connected with the bone; the glands were not affected. The patient's general condition was so bad that amputation at the shoulder-joint was out of the question, and the patient was discharged as incurable. He died about a year after, so that the disease altogether lasted about fifteen months.

According to the report of Dr. Albert, assistant in von Dumreicher's Clinic, the original tumour was situated in the subcutaneous cellular tissue, and recurrence took place in the cicatrix of operation. No difficulty was found in removing the growth on either occasion, and as far as could be felt and seen, the whole of it was extirpated.

The case well illustrates the extraordinary rapidity with which many sarcomatous tumours recur after operation. It is of rare occurrence for a recurrent tumour within six weeks to attain double the size of a fœtal head. During the ten months preceding operation, the growth had only reached the size of a goose-egg, while after an operation—to all appearance radical—it grew within two weeks to the size of a hen's egg, and after a second similar operation, to twice the size of a fœtal head.

Spindle-celled sarcoma, originating in the sheaths of the tendons.

This case is remarkable not only on account of the tumour, but also for the symptoms following the administration of chloroform.

Johann A—, æt. 38, stated that from early childhood his left forearm had been thicker than the right. Nine months before admission, he received a blow on that arm, which caused him severe pain. A small lump formed at the site of injury, which remained stationary for a time, and then began to increase rapidly. I amputated the arm through the lower third. The hæmorrhage was controlled by acupressure. Immediately on the conclusion of the operation, while the patient was still under the influence of chloroform, a sixth of a grain of morphia was injected. The operation was performed at 11 o'clock in the morning, and from that time until six in the evening the patient was in a state of wild delirium; he did not recognise those standing about him, stated that he had been poisoned, attempted to escape, etc. Towards night the mania passed off. Five days later, he had a rigor, and fifteen days after the amputation he died of pyæmia. Post mortem: the cellular tissue of the posterior wall of the pharynx opposite the third and fourth cervical vertebræ was infiltrated with purulent matter; purulent thrombi were found in the femoral and iliac veins and in those of the stump as well as purulent infiltration of the connective tissue about the right elbow-joint.

Osteo-sarcoma of the clavicle.

Therese E—, æt. 15, was admitted in 1870. She related that a year previously, as she was lifting a heavy weight, she experienced a sudden pain in the left shoulder, and was unable to work for some days. About a month before admission, she had noticed a tumour the size of a walnut on the left clavicle. I found the outer half of this bone occupied by a firm, elastic tumour of the size of a hen's egg, reaching nearly up to the acromial end. I removed the growth by sawing through the clavicle at the junction of the internal and middle thirds, and enucleating the bone at the acromial articulation. The patient was discharged a month later, with a small sinus, leading down to a piece of necrosed bone on the sawn extremity of the clavicle. She had full use in the arm; the growth proved to be a small-celled osteo-sarcoma, in the centre of which the bone was completely destroyed.

About a year and a half later, the patient was again operated on for a local recurrence of the growth, of about the same size as the former tumour. Notwithstanding the extensive resection of the clavicle, the utility of the arm was not in the least impaired.

Osteo-sarcoma of the humerus.

This tumour, which appeared in a man, æt. 27, was attributed to an injury received a year previously, and had attained the size of a child's head. The arm was amputated at the shoulder-joint. The tumour was found to be a periosteal large-celled sarcoma. The wound healed, but the man died two months later of pleurisy and pericarditis. After death, numerous sarcomatous nodules were found in the pulmonary and costal pleura.

Central osteo-sarcoma of ulna. Resection of the affected bone on two occasions.

A girl, æt. 16, was admitted who, nine months previously had sprained her right wrist. Some pain persisted in the lower end of the ulna after the injury, and four months later some swelling was noticed. The surgeon who was attending her, thinking that the symptoms were due to periostitis, cut down on the swelling; no pus escaped, but new growth protruded from the incision, and foul, sanious discharge followed. The girl had become so reduced that her condition seemed most critical when I first saw her. On minute examination, I made out a central osteo-sarcoma in the lower part of the ulna; the growth was in great part encapsuled by the periosteum. I therefore proposed resection of the lower part of the ulna, instead of amputation, as had been suggested. The wrist-joint was unavoidably opened in the operation, but I succeeded in preserving all the tendons and nerves; a portion however, of the ulnar artery was excised. The skin of the soft parts, after removal of all suspicious tissue just sufficed to cover the wound. Under antiseptic treatment with boracic acid, the patient recovered perfectly, and a few months after the operation, the functions of the hand were so perfectly restored, that she was able to play the harpsichord and do any fine work. Such a result exceeded my most sanguine expectations. For nearly two years all went on well, but then pain and swelling commenced about the cicatrix, and gradually the growth began to recur. When the tumour had attained the size of a hen's egg, I removed it again. It was then connected to the lower end of the ulna, but did not appear to have sprung from it. She again recovered, with perfect use of the part.

Epithelial carcinoma of the upper arm, originating in the wound of an issue.

The following case is of particular interest, for it shows that under certain unknown conditions, constant irritation, which usually causes merely simple ulceration, may give rise to the development of true carcinoma.[1]

[1] Compare the case of coccygeal tumour related above, p. 337.

Samuel C—, æt. 54, a Jewish merchant from Belgrade, had been very subject to inflammation of the eyes. Twenty-eight years before I saw him, two issues had been made on the back of the neck and on the upper arm from which considerable suppuration was kept up: six months before he came to me, the granulations of the issue wound in the arm became more sensitive and the edges harder, while the ulcer increased in size. I found an ulcer the size of a florin, in appearance highly suggestive of epithelioma, over the insertion of the deltoid muscle. Induration could be felt extending deeply down, probably to the surface of the bone. The patient was so weak and anæmic that I merely destroyed the growth with paste.

He died of febrile marasmus and erysipelas some three months later. The eschar was examined microscopically, and proved to be a well-marked epithelioma, particularly rich in epidermic cells.

CHAPTER XVII.

INJURIES AND DISEASES OF THE LOWER EXTREMITY.

SECTION A.—INJURIES.—*Frost-bite. Contusions of the hip. Fracture of neck of femur. Case of gangrene after fracture of femur. Treatment of simple fractures of femur; of leg; of fibula; of patella. Case of pyæmia after simple fracture. Case of fracture of necrosed femur. Case of softening callus a year after union. Cases of faulty union. Cases of pseudarthrosis. Treatment of pseudarthrosis. Cases of ununited fracture; repeated operations. Remarkable case of compound fracture of thigh. Compound fracture of leg—case. Cases of compound dislocation of ankle. Cases of dislocated hip. Case of dislocation of astragalus. Wound of both tibial arteries—case.*

FROST BITE. (W. B.)

When the greater part of the foot is frost-bitten, my rule is to wait for a complete line of demarcation to form, before resorting to amputation. Judging from more recent experience, I think I should now, in such cases, operate at an earlier date. It rarely happens that parts, which, after thawing, are blue in colour and covered with blebs, again come to life, even when arterial blood follows a deep puncture with a needle. Owing to the decomposition of the tissues, there is always risk of phlegmonous inflammation starting in the deeper parts and leading to general septic infection, for the process of absorption, still—though feebly—goes on. The danger arising from this cause certainly overbalances the advantage gained by waiting for the line of demarcation to form in the skin; we might possibly, by waiting, be able to amputate an inch or two lower down, but the patients not infrequently die before

the stage of demarcation is reached. My opinion therefore is, that we should amputate through healthy parts as soon as the gangrene has declared itself up to the middle of the foot or to the leg. In the case of frost-bitten toes alone, we may wait for spontaneous separation.

Contusions of the Hip.

Contusions about the trochanter were common enough; the patients came under treatment at very varying periods after the injury. When no distinct fracture or luxation is evident, the diagnosis may be very difficult; fissure of the acetabulum, extravasation of blood into the joint, with circumscribed periostitis about the trochanter, may be suspected where the function of the part is impaired for any great length of time. Such cases are best treated by simple rest in bed; in many instances the pain and tenderness do not altogether disappear for two or three months. In no case which has come under my observation have I seen chronic coxitis develop, but the patients were usually strong, healthy men.

Fracture of the Neck of the Femur.

Of nineteen cases which came under me at Zürich, eight were extracapsular and eleven intracapsular fractures. When possible I always apply a plaster-of-Paris bandage in these cases, but it is undesirable to adopt this mode of treatment when the patients are very much reduced, and likely to get bed-sores. For such I found the best plan was to keep them quietly in bed, with the hip and knee flexed, the legs being bent over a pillow at the knees. One man, æt. 73, died of pyæmia forty-three days after the injury.

Fracture of the femur, followed by gangrene.

Conrad G—, æt. 23, was struck by a heavy rolling-stone on the right thigh. He was unable to stand upright after the injury, and was brought a few hours later to the hospital with a fracture of the femur four or five inches above the knee, and much contusion of the soft parts. A temporary

arrangement of splints was applied at first, and the following day a plaster bandage over an ample layer of wadding. Two days after the injury, I was struck by the white appearance of the projecting part of the foot, and had the bandage cut off. The blood in the subcutaneous veins of the leg was, however, completely stationary, and the skin up to the knee was devoid of all sensation. I supposed that the femoral artery had been injured by the fracture, and had become extensively thrombosed; gangrene of the leg followed, and it was some time before the line of demarcation was distinct. The patient was already suffering from septic poisoning when I amputated the thigh high up, and he died a few days later of pyæmia. The femoral artery was found to be completely torn through three inches above the hollow of the knee; the edges of the rent were ragged and rough. A long thrombus extended upwards and downwards. In all probability this had formed very rapidly and prevented the development of a traumatic aneurism.

It is well known to every surgeon that in bad fractures of the femur the displacement cannot be completely corrected by any plan of treatment. Careful attention and frequent changing of the plaster bandage will do much to diminish the shortening. The best method of applying plaster bandages in fractures of the thigh and in coxitis has been so excellently described by Roser, Volkmann, C. Weber, Lücke, and others, that I can add nothing to what they have said.

During 1869-1870 some fractures of the femur in my clinic were treated by plaster-of-Paris bandages, others by extension. The number of my cases (14) was too small to enable me to give any decided opinion as to the advantages of one method over the other; still, I may say that extension alone is sufficient in most cases of fractured femur, but that if the displacement be very considerable, it is but little more effective than the plaster bandage. Plaster bandages were applied over the knee, and beneath the calf of the leg from about the commencement of the tendo-Achillis. Whether the plaster was applied over wadding or flannel, or next to the skin made no difference in one respect; within eight days the bandage invariably became so loose that it was drawn down by the weight to the heel, and if care were not taken, it was liable to cause ulceration about the malleoli. A very slight weight can be used with the plaster bandage, five pounds at the outside; the bandage should be changed about every eighth day. On the whole, I far prefer extension by means of ordinary strapping; this I apply generally on Volkmann's plan, as follows:—An ordinary Petit's boot is applied, reaching up to the ham: on to this a square plate of wood is screwed, and extension

made by means of strips of plaster laid along the sides of the limb. The boot forms, as it were, part of the leg, and can be taken off—plaster, weight, and all—very readily. The advantages of this method of treatment have been so clearly shown by Volkmann, and more recently by Schede, that any further encomiums from me would be superfluous. Every method of extension has one disadvantage, viz. that in the unavoidable movements of the patient, the upper fragment is more disturbed than it would be if encased in a firm bandage: even if the patient is laid on a sacking stretched over a frame which can be removed and replaced when necessary, this drawback cannot entirely be obviated. Although the pain is diminished by traction on the fractured ends, yet in some very sensitive patients the plan does not answer. If only small weights be employed, sufficient counter-extension will be secured by raising up the foot end of the bed; when a heavy weight was necessary, I employed a perineal strap; one end passed beneath the sacrum and was secured to the head of the bed, the other passed vertically upwards, and was fastened to a sort of gallows apparatus, immediately above the patient. Counter-extension in this way is less annoying, and more freedom is allowed for the movements of the body.

Two patients came under treatment, in whom the thigh was in an osteo-porotic condition, after old arthritic disease. In one case the knee, in the other the hip was affected. The fracture was due to very slight injury. Consolidation of the fracture took place in twenty-seven and thirty-two days respectively.

(W. B.)

In fractures of the lower epiphysis of the femur or of the condyles, and for fractures extending into the knee-joint, I have now (1876) altogether abandoned the plaster bandages in favour of treatment by extension; I find that the latter method is more convenient for the patient as well as for the surgeon, that union takes place more rapidly, and that the tendency to shortening can be better controlled than by the plaster treatment. The extension treatment is admirably adapted for hospital practice; still, I by no means wish to deny the excellent results gained by treatment with firm bandages.

Fractures of the Leg.

In these cases a plaster-of-Paris bandage was invariably applied at the earliest opportunity. It is sometimes said that plaster bandages materially interfere with the formation of callus, and render the patient liable to pseudarthrosis. With regard to this statement, I can only say that in healthy subjects, out of eighty-six cases, I only met with six where the amount of union after six weeks was insufficient to allow the patients to stand on the limb. The patients are able as a rule, to get about on crutches within this period; in the six cases mentioned (in four of which the fracture was in the upper third of the leg[1]) no pseudarthrosis formed. At the same time, it is undoubtedly true, that if an unyielding bandage be applied early, and much pressure exerted, the formation of the external callus is interfered with, and union is thereby delayed. But this method appears to exercise no injurious effect on the formation of the definitive callus; still, the early application of the plaster bandage has innumerable advantages, both to the patient and to the surgeon. In fact, my statistics show that the causes of pseudarthrosis are not to be found in the early treatment by rigid apparatus, as has been unreasonably asserted; the cause lies deeper, and depends upon the conditions of nutrition of the patients.

Fracture of the Lower end of the Fibula.

Fractures of the lower part of the fibula, with the luxation-like dislocation which is often very considerable in these cases, used formerly to occasion a great deal of trouble in treatment. Even now, oblique union is more common after this fracture than after any other which I have met with. By means of an anæsthetic and a well-applied plaster bandage, the difficulty in treating these cases can be completely overcome, that is, with competent assistance. For the consolation of my colleagues, to whom this latter requisite is not always forthcoming, and who have seen such fractures unite obliquely under their splints and bandages, I may add, that these

[1] And in which the nutrient artery of the bone may have been injured, thus causing, as Mr. Curling has shown, delayed union of the fracture.—[Ed.]

patients, after a year or so, become astonishingly clever in getting about, and after a couple of years will scarcely be aware that they have any deformity. Of course, however, it is more to the interest of the patient that such should not be the case. Massage will be found the most useful means of improving the movements of the ankle-joint, which are often much impaired.

Fracture of the Patella. (W. B.)

In treating this injury, I have found no inducement to depart from the old methods of treatment, such as putting the limb up in splints or a plaster bandage, frequently drawing the fragments together by strapping and the like. Those who have had plenty of opportunities of seeing how well people are able to get about with the fragments of their patellæ an inch or more apart, will hardly be tempted in ordinary cases to proceed to any cutting operation. If a case should be met with where the patellar fragments are much separated, and the limb useless, an operation like that for pseud-arthrosis, such as resecting and uniting the fragments, might properly, under antiseptic precautions, be undertaken.

Simple fracture of the leg, followed by pyæmia.

A man, æt. 84, was run over, and sustained a fracture of the upper third of the left leg. There was scarcely any discoloration of the skin. Considering his age he was fairly strong and well, and, as we subsequently found, the arteries were nowhere atheromatous except in the brain. A plaster bandage was applied over the knee. On the fourth day the temperature shot up to 103·6°, and on the fourteenth day to 104°, varying between this level and the normal. The patient lost strength daily and complained of difficulty of breathing; finally, œdema of the lungs set in, and he died fifteen days after the injury. Post mortem: "Commencing formation of callus at the situation of fracture, the parts around, as is usual at this period of fracture, being somewhat infiltrated and of a dark brownish-red colour. Thrombosis of the left femoral vein, and embolism of some of the branches of the left pulmonary artery. In both lungs infarcts and abscesses; the cerebral arteries atheromatous, and in the brain numerous small breaking-down deposits,"[1]

[1] Fat embolism (?).—[Ed.]

Fracture of necrosed femur.

A boy, æt. 11, had suffered from necrosis of the femur for nine years; numerous sinuses had formed over the lower end of the bone. Ten days before admission he had a fall on the affected limb, which was followed by much pain and swelling; the invaginating sheath of bone was found, on admission, to have been fractured. I performed sequestrotomy in the usual way, and applied extension. The operation was, however, followed by extensive suppuration, which finally attacked the knee-joint, so that I was forced to amputate the femur high up. He recovered, but the wound did not perfectly heal. The stump of bone was found to be so extensively diseased that I disarticulated it. The patient ultimately did well.[1]

Softening of callus twelve months after union of fracture.

Eugenie H—, æt. 13, a well-developed but highly-nervous child, had, according to her mother's account, fractured her leg when three years old. The limb united in good position, but she had pain whenever she bore on the foot. A year after the injury the leg commenced to bend at the seat of fracture. Iodine was applied but did not check the pain, and in spite of an apparatus the curve became worse. Eventually the pain increased to such an extent that the patient was for a long time confined to her bed. When she came under my care the lower half of the left leg was bent backwards at an angle of about 110°. At the back of the limb the muscles of the calf were very prominent, and just at the angle of the bend the tibia was much thickened. By means of Rizzoli's apparatus the bone was easily fractured, and the limb was then put up in good position in a plaster bandage. The reaction after the operation was extraordinarily severe. I never met with a case where so much pain was experienced at the seat of fracture; the amount of swelling was very moderate. The plaster bandage was repeatedly changed; ice and leeches were applied, but the pain could only be controlled by subcutaneous injections. I expected an abscess in the bone. At the end of a month we found reason to believe that the pain was not all genuine, and this view was confirmed by the fact that injections of distilled water completely controlled her sufferings. Two months after the fracture the bone was firmly consolidated, but there was still some œdema of the leg. Complete recovery followed, though it was slow. Two years later I heard that she could walk freely without limping, and was able to dance.

This is the only case which I have met with, in which softening

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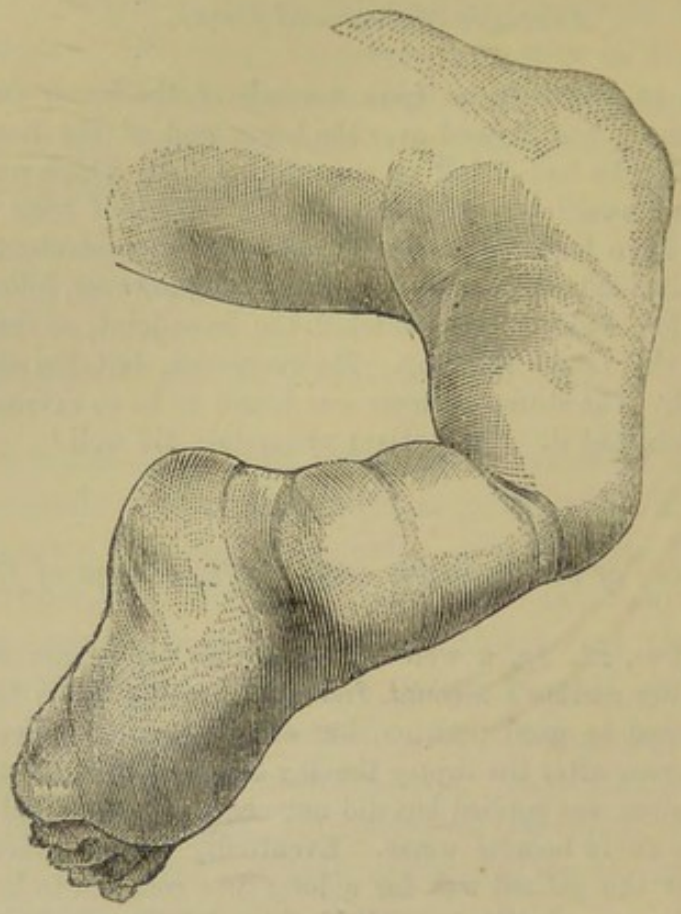
[1] A case somewhat of this nature is reported in 'St. George's Hospital Reports,' vol. viii, p. 533. Recovery followed, with good union.—[Ed.]

FIG. 19.—FAULTY UNION OF INTRA-UTERINE FRACTURE.



of callus, followed subsequently by sclerosis, commenced a year after the consolidation of a fracture. Probably at the time that I fractured the limb I splintered the bone, and the slow absorption led to some ostitis, which thus hindered the patient for a long time from using the limb.

Faulty union after fracture of the leg.

A man, æt. 40, fourteen months previous to his admission to the hospital had sustained a fracture of the external malleolus, and sub-luxation of the astragalus. Considerable deformity resulted from the injury. An inch and a half above the malleolus there was a sharp bend in the leg, and the heel was displaced outwards so that the position of the foot was like that seen in a high degree of valgus. Good union had taken place, but he was not able to walk well. With great difficulty I managed to improve the position of the foot, by breaking through the new formed bone, and eventually was so far successful that the patient was able to walk fairly well with the help of a specially constructed boot. It was found impossible, however, to correct the deformity of the foot completely.

FAULTY UNION OF THE LEG AFTER INTRA-UTERINE FRACTURE.

The child, whose leg is shown in the illustration (Fig. 19) was born with the deformity, but died before any treatment was adopted. I met with another similar case, in an infant four months old, in whom I was able easily to fracture the bone and straighten the limb.

Pseudarthrosis of the femur.

A man, æt. 66, strong for his age, came under treatment with a pseudarthrosis about six inches above the knee-joint. Four months previously he had sustained a very oblique fracture at this spot, which had been treated by plaster bandages. The fragments were only moderately displaced, but could not be induced to consolidate. When he came under my care I first put up his leg in a hollow splint without any bandage, and painted tinct. of iodine over the seat of the fracture. Then I applied forcible extension by Schneider-Mennel's apparatus till the displacement of the fragments was corrected; the ends were then forcibly rubbed together, and the limb immediately put up in a plaster-of-Paris bandage. Distinct callus was thrown out after this, and within two months he had recovered sufficiently to be able to walk on the affected limb.

A man, æt. 50, was admitted with an ununited fracture of the left femur of fourteen weeks' standing. The fragments were forcibly rubbed together, and a plaster bandage applied. At the end of two months the bandage was removed, but no union had taken place; accordingly five ivory pegs were driven into the fragments and a firm bandage at once applied. The reaction that followed was but slight; suppuration took place around some of the pegs, which were then removed and some new pins were driven in. Hereupon great reaction followed; some of the pegs kept firm, but around others phlegmonous inflammation started, which gradually extended down the whole leg and led to the formation of many abscesses. Consolidation, however, of the fracture slowly took place, and abundant callus was thrown out. In eight months the patient was discharged cured.

Ferdinand O—, æt. 50, sustained a fracture of both bones of the leg about the centre. A plaster bandage was applied. Some two months later, on removing the bandage, it was found that there was no union. The fragments were rubbed together and plaster again applied. On the removal of this latter bandage, however, it was discovered that a regular pseudarthrosis had formed. The fragments were again rubbed together, tinct. of iodine was painted on the leg, and phosphorus pills given, but without any improvement. I then applied electro-puncture, both poles being sunk down on to the pseudarthrosis; at first no reaction followed, but subsequently swelling began, which increased more and more; extensive suppuration set in with rigors and the thigh was amputated, but the patient was already in a pyæmic state, and he died soon after.

I have already recorded a case of pseudarthrosis, treated by electro-puncture, followed by pyæmia and death. I recollect a case also, under my care at Zürich, which illustrates well the evil results that may arise from still milder treatment. A simple fracture of the bones of the leg was found ununited after the ordinary period of rest in bandages. I then placed the leg upon a splint, and ordered strong tincture of iodine to be painted daily over the fracture. Considerable dermatitis resulted, and blebs formed, as I expected, but there followed also results which I had by no means looked for; the dermatitis ran on to phlegmonous inflammation, suppuration, and gangrene of the skin, and the patient died of pyæmia. The case is of considerable importance, for it shows that even six or eight weeks after fracture, we must be careful in the application of iodine, and furthermore, that the English preparation (Tinctura Iodi Fortior) has a far more potent effect than we are accustomed to observe when our officinal tincture is employed.

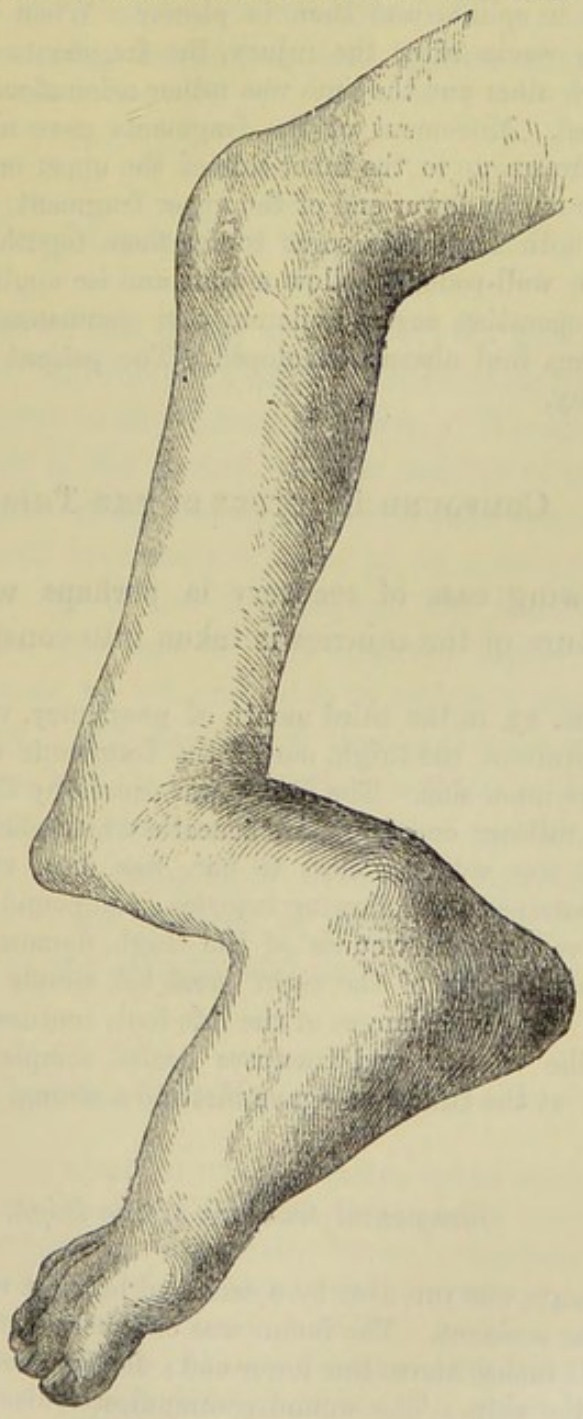
In treating ununited fracture by the insertion of ivory pegs, I find that it is of the greatest importance to use pegs of at least two lines diameter; from four to eight should be driven in deeply and firmly; no suppuration ought to follow, if the osteo-plastic process is to succeed. As soon as the pegs become loose they should be removed and replaced by larger ones.

Pseudarthrosis.

Alois W—, æt. 24. When four years of age he fractured the lower third of his right leg, for which he was treated at a children's hospital. When discharged, an apparatus was supplied by the aid of which he was enabled to walk. This, however, was not renewed, and the fragments gradually assumed an exceedingly faulty position. The lower third of the tibia was flexed backwards at a right angle with the rest of the shaft (see Fig 20). Attempts were made to straighten the limb, but the tendo-Achillis offered an insuperable obstacle; the growth of the whole limb had been arrested, and the muscles were ill developed, although the child generally was fairly strong. The tendo-Achillis was divided, and I was able, though not without exerting considerable force, to straighten the leg. It was then found that there was shortening to the extent of three inches; the fragments lay one above the other. In order to improve the position a weight and pulley were applied, and subsequently the two fragments were united together by means of a thick platinum wire; the ends of the bone were atrophied and denuded of periosteum. The wires were allowed to remain from the 28th June to the 20th October but no union took place, nor did any follow the

employment of ivory pegs. I then cut down upon the ends and split up the fragments longitudinally with a chisel—again without any success. A month later I tried to obtain union by means of a platinum wire again; this operation was followed by an attack of erysipelas. Then for two months I tried

FIG. 20.—UNUNITED FRACTURE OF THE LEG.



the constant current, the needle connected with the zinc plate being deeply sunk into the cicatrix. Finally, at the patient's request, the limb was amputated at the seat of fracture, for it was evident from the amount of shortening that, even if union took place, he would scarcely be able to walk well.

Ununited fracture of the leg: operation: death.

J. H.—, æt. 31, a turner, a tolerably strong man, fell from a waggon and sustained a simple fracture of the right leg about the centre. The limb was put up at first in splints and then in plaster. When he came up to the hospital fifteen weeks after the injury, the fragments were still perfectly movable on each other and the limb was rather œdematous. The patient was pale and wasted. Movement of the fragments gave no pain; the lower fragment was drawn up to the inner side of the upper one. I cut down by a small incision on the lower end of the upper fragment, and passed a plated screw through both fragments so as to fix them together. The limb was then put up in well-padded hollow splints and ice applied. On the fourth day after the operation severe inflammation commenced around the screw, and a large, deep, foul abscess developed. The patient died of pyæmia on the thirtieth day.

Compound Fracture of the Thigh.

The following case of recovery is perhaps unique, when the extensive nature of the injuries is taken into consideration.

A woman, æt. 23, in the third month of pregnancy, was admitted with a compound fracture of the thigh, one of the fragments of which penetrated the skin on the inner side. The injury was caused by the fall of a mass of earth from a railway embankment, beneath which she was buried. Her husband, who was working close to her, was dead when dug out. The patient had sustained the following injuries: compound fracture of the right thigh, extensive contused wounds of the thigh, dorsum of the foot and the face, compound fracture of the right great toe, simple fracture of the left leg and some of the phalanges of the left foot, contused wound of the left thigh. All the wounds and fractures healed completely in six months, and she then—at the full time—gave birth to a strong, healthy child.

Compound fracture of the thigh.

A man, æt. 47, was run over by a cart, and brought up to the hospital four hours after the accident. The femur was obliquely fractured and splintered two and a half inches above the lower end; the fragment protruded through a wound in the skin. The wound communicated also with the knee-joint. He had also a scalp wound three quarters of an inch long over the parietal bone; the left pupil was dilated to twice the size of the right. Circular amputation was performed through the lower third of the thigh; the arteries were found to be atheromatous. On removing the acupressure needles after thirty-eight hours, hæmorrhage took place from the femoral artery, and this

vessel was then ligatured. Ichorous suppuration took place in the wound, and the skin wounds partially sloughed. On the tenth day erysipelas attacked the stump, and on the twelfth the wound on the head. He became comatose, and died thirteen days after the injury.

The temperature was observed to rise after death. Post mortem: pleurisy of the right side; meningitis and extravasation over the left hemisphere.

Compound Fracture of the Leg. (Z. B.)

Ninety-three cases of this injury came under my care at Zürich; fifty-seven recovered, and forty-six died. These cases natually vary very much with respect to the extent of injury. We know that it is not always the size of the wound, nor the number of comminuted fragments of the bone, which has to be taken into account in our prognosis. The result materially depends on the extent and severity of the contusion, the age of the patients, and the conditions under which they are placed and kept directly after the injury.

In complicated cases, we are only able to estimate approximately the amount of injury. We sometimes find out more about them during their progress, but then it is often too late. In my table cases only are recorded where the wounds were undoubtedly connected with the fracture; these alone should be counted as compound fractures. It is not possible to make any classification of the cases according to the severity and importance of the injury.

Compound fracture of the leg.

Joseph S—, æt. 42, was admitted with a fracture of the right leg an inch above the ankle, the result of a fall. The integuments were torn away from the upper fragment an inch and a half. A plaster bandage was applied and open treatment adopted. For eighteen days he went on well, but then swelling and pain occurred, and he became feverish. Incisions were made, a large quantity of foul pus let out, and some fragments of the fibula removed. Two days later hæmorrhage occurred from the incisions, and again the day after. The femoral artery was then tied in the middle of the thigh; gangrene of the foot ensued, and eventually amputation was performed through the lower third of the thigh. He died a week after the operation. Post mortem: Abscesses were found in the lungs and liver; on both sides of the ligature on the femoral artery were found firm clots.

Compound Dislocation of the Ankle-Joint.

Four of these cases came under my care at Zürich; in two attempts were made to save the part, but amputation was found necessary on account of diffuse cellulitis, which commenced on the fifth day in one case and on the thirteenth in the other. One patient died of pyæmia, the other of septicæmia; in a third, amputation was performed at the knee-joint on the thirty-sixth day, on account of suppuration of the ankle-joint and diffuse phlegmonous cellulitis. The patient died six days after the operation.

A man, æt. 69, came under my care, who had been treated elsewhere for a compound fracture of the ankle, and fracture of the external malleolus. Suppuration of the ankle-joint followed, and as the sinuses could not be got to close the patient came up to the hospital four and a half months after the injury. On examination the astragalus was found to be completely necrosed and loose; the sinuses were dilated, and the bone extracted. Fifteen months later I saw him; ankylosis had taken place between the tibia and the os calcis; the shortening was very slight, and the patient could walk without a stick.

(The above cases are described as "fracture of the malleolus with wound of the ankle-joint;" they seem to resemble those usually described in this country as compound dislocation of the ankle, though it is true that there is usually only subluxation of the foot.—Ed.)

Compound fracture at the ankle-joint.

Three cases of this nature came under my observation between 1869-70, at Vienna.

The first was that of a man, æt. 52, who fell from a height on to his feet, and sustained a splintered fracture of the external malleolus, and a simple fracture of the internal malleolus. Below the latter was an opening the size of a pin's head. A probe was passed in, but did not touch exposed bone; it must, however, have been due to injury from within, as there was no hole either in the stocking or the boot. For the first few days there was some sanious discharge which ceased on the sixth day. Open treatment was adopted, and he recovered with a perfectly moveable ankle-joint.

A man, æt. 20, was admitted with complete dislocation of the foot; the lower extremities of both the bones of the leg protruded through an opening at the inner side of the ankle. It was found necessary to remove an inch of

the bones before the displacement could be corrected. Open treatment was adopted, and he recovered in five months with a limited amount of active and passive movement in the joint.

A somewhat similar injury was observed in a boy, who had been run over by a waggon. A plaster bandage with a window was applied. On the third and fourth days after the injury he had rigors, followed eight days later by thrombosis of the saphena vein and gangrene of the toes. Death from pyæmia on the twelfth day. Abscesses were found in the lungs, and breaking-down coagulations in the veins.

Compound fracture at the ankle-joint. Antiseptic treatment.

A man, æt. 44, was admitted with this injury; resection was found necessary before the tibia could be reduced. Under antiseptic treatment he recovered rapidly.

A man, æt. 60, with the same sort of injury, but who had made a long journey from Hungary, and was only admitted three days after the accident, was treated in the same way. Septic phlegmonous infiltration followed. On the eleventh day after the injury the thigh was amputated, but the patient, who was already in a pyæmic state, died three days afterwards.

Old dislocation of the hip-joint.

A man, æt. 43, was admitted with a dislocation of the hip on to the dorsum of the ilium, of 134 days' standing. The injury was not recognised at the time of the accident. Two days after his admission (the 136th day) reduction was with some difficult effected, under an anæsthetic, by manipulation. A month later the patient went home, and was able to walk fairly well, though not without a stick.

Dislocation of hip.

A man, æt. 27, fell from a ladder and dislocated the head of the femur over the foramen ovale. Reduction was effected by manipulation. The first movements seemed to shift the head of the femur on to the dorsum ilii. Under an anæsthetic flexion and outward rotation effected reduction.

In a child, æt. 11, with a dislocation of the femur upwards and backwards of three months' date, reduction was found impossible.

Dislocation of the astragalus. Reduction. Necrosis.

A man, æt. 29, was admitted with complete dislocation of the astragalus. The bone was displaced outwards and forwards, and the skin over it stretched

and discoloured, but not wounded; the foot lay in a position of marked varus. After numerous unsuccessful attempts, reduction was at last effected easily on exerting powerful traction on the heel. A fortnight later the skin was found gangrenous on the outside of the ankle; the astragalus became completely necrosed, and was removed three months after the injury.

Wound of both tibial arteries.

A strong labourer, æt. 31, received two stabs from a knife in the left leg. Judging from the appearance of the high boot, which he brought with him, both the stabs had been inflicted from the outer side. One was close to the crest of the tibia, the other a little higher up and more posterior. Two hours after the injury, when the boot was taken off it was found to be full of clotted blood. The leg was perfectly cold and insensitive, not at all swollen, but of a bluish colour from the sugillation. No hæmorrhage could be seen; cold compresses were applied. The leg became darker and darker in colour and lost power of movement, and when he was brought up to the hospital a month after the injury, the limb was already in a state of mummification up to the head of the tibia. Not only had a complete line of demarcation formed, but the mummified parts were detached and retracted from the bones, so that at the bottom of the line of demarcation the bones were exposed for about an inch. As in gangrene from thrombosis of the popliteal artery, the line of demarcation was at a lower level behind than in front. The bones were sawn through, and the flap brought up from behind. Slow convalescence followed.

SECTION B. ACUTE AND CHRONIC INFLAMMATIONS.—*Cases of acute phlegmonous inflammation. Spontaneous gangrene from embolism. Gangrene from disease of the smaller arteries—Case. Case of gangrene from anæmia; from some unknown cause. Amputation in gangrene. Cases of gangrene; spontaneous; from embolism of subclavian; senile. Varieties of gangrene. Case of ulceration of leg with lengthening of the limb. Cases of gangrenous ulceration. Periarticular abscess. Acute gonitis—Case.*

Cases of acute periostitis and osteomyelitis; of femur; of tibia; remarks. Cases of osteomyelitis with separation of epiphyses. Case of acute ostitis. Cases of subacute osteomyelitis. Ditto affecting numerous bones. General remarks on acute periostitis and osteomyelitis. Other cases of the

same disease. Case of ditto with lengthening of the limb. Very chronic ostitis.

Acute phlegmonous inflammation of the leg.

A man, æt. 46, received a slight contusion on the shin, not sufficient to first to prevent him from doing his work. A week after the injury he was admitted with all the symptoms of pyæmia, and on the following day he died. Post mortem: evidence of chronic alcoholismus was discovered in the cirrhosed liver, and the condition of chronic intestinal catarrh; in addition abscesses were found in the lungs.

A man, æt. 54, of intemperate habits, came up to the hospital fifteen days after receiving a slight contusion on the right leg, with an extensive phlegmonous inflammation of the integuments, a portion of which, the size of a florin, was gangrenous. Incisions were made, and the whole of the subcutaneous cellular tissue of the leg was found to be destroyed and sloughing. Death followed from pyæmia. Suppurative phlebitis was afterwards found in the bones of the leg. In the lungs were recent infarcts and evidence of chronic inflammatory disease.

When abscesses form in highly acute cases like the above, it might be well to boldly cauterise the incisions, as well as the surface of the wound. As a rule, the milder cases only run on to suppuration; the worst class prove fatal before abscesses form. We can hardly imagine that the internal exhibition of Liquor Ammoniæ, the efficacy of which is so much vaunted in snake-bite, could here be of any avail. In cases like these, amputation is nearly always futile.

Spontaneous gangrene from embolism of the popliteal artery.

Anna S—, æt. 22. Three weeks before admission the patient had been confined of a stillborn child. Some days previous to this she had experienced sudden weakness and pain in the left leg; the limb swelled and became cold and blue, and when admitted into the hospital the whole of the leg was in a state of moist gangrene. She died of septicæmia about a week afterwards. Endocarditis was found, and the embolism was evidently due to a clot which had originated from the mitral valve. The case resembles one already mentioned, *supra*, on p. 366.

Gangrene from disease of the smaller arteries.

A woman, æt. 55, was sent in with the diagnosis "typhus." Nothing

much could be learned from her history. When admitted gangrene was commencing in her left leg. She improved and recovered her strength, but we could form no positive diagnosis. The arteries were rigid. The gangrene, which was perfectly dry, was limited by a line of demarcation formed just below the knee, from which a tongue of skin extended downwards. At the proper time I sawed through the bones below the line of demarcation and turned up a flap of skin to cover the wound. The wound slowly healed, but was not soundly united for eight months. Six years later I heard that she was in excellent health.

The following case I only saw from time to time in consultation, and am unable, therefore, to give very minute information.

Lord G—, a man æt. 53, of highly aristocratic English descent, had suffered severely for many years from gout. While he was at Aix-la-Chapelle for this disease, slight paronychia commenced on the great toe of the left foot; gradually gangrene developed over the anterior part of this toe. The gangrenous portion separated very slowly. The patient frequently complained of sudden loss of sensation in certain parts of the body, especially in the left leg and in the face. Nothing abnormal could be detected in the arteries or the heart. I saw the patient in 1862, and heard afterwards that he died in 1863. The diagnosis of the English surgeons was "arterial disease."

Gangrene from anæmia.

I can give no other cause than the above for the disease in the following case.

J. H—, a cobbler, æt. 35, had suffered two years (?) previously from frost-bite of the right foot. During the month of October he was constantly at work in a cold workshop, and his feet and legs were always icy cold and almost without sensation. When he was able to warm them again, some of the toes turned to a blue colour, and this was accompanied by itching of the part. While crossing the Brünig (a tolerably high Swiss pass) in the month of November, the nose and the toes became partially frost-bitten. Soon after this he began to lose strength, and was forced to lie up in a hospital at Lucerne on account of swelling of the leg. The patient was of slight build, rather emaciated, and of very pale, sallow aspect. The end of the nose was of a brownish-blue colour and dry. The gangrenous portions of the skin were defined, but the line of demarcation showed no trace of discolouration, either reddish or bluish. A portion of skin between the second and third toes was dry and gangrenous, and the parts around them sensitive. Under good dietetic and other conditions the gangrenous part of the nose separated, but the process went on in the foot, and the right foot also became affected. No arterial disease could be found, nor anything wrong with the heart. The patient became gradually marasmic as the gangrene of the feet became

moist, and extended more and more rapidly, involving all the parts up to the heel. In spite of all kinds of tonics, locally and internally, the patient died of intense marasmus two months after admission. The post mortem was most carefully made by Professor Rindfleisch. No disease could be found in any organ, but there was the most marked general anæmia. The spleen was not enlarged; the blood was thin and watery, but not containing an excess of leucocytes. The muscular substance of the heart was flabby, but not fatty.[1]

Gangrene from some unknown cause.

Frau G—, æt. 37, came under my care in 1865. She had been married, and had born three children, but had been a widow for some years. Two years before her admission she suffered from occasional pain in the legs, sometimes lasting for a few days, sometimes for weeks. A year previously the left little toe had become inflamed; suppuration occurred, but the parts all healed up. Seven months previously she had suffered from severe darting pains in the leg, which sometimes confined her to her bed for days together. This was followed by suppuration between the fourth and fifth toes, which again healed up. Four months before admission (in the month of June) suppuration again occurred at the former seat of disease, and was followed by gangrene of both the toes. These were removed by a surgeon. The wound would not heal, and the gangrenous process gradually extended over the toes and foot. Her strength began to fail, and when she was admitted into the hospital she was in a very reduced state—greatly emaciated and with sloughing bed-sores over the sacrum. By the greatest care and attention she was brought round. The left foot separated at the ankle-joint, and subsequently the articular surfaces of the tibia and fibula were sawn off; the tissues left were insufficient to cover the end of the stump. She suffered more from the bed-sores, however, than from the gangrene of the foot. There were sores on the sacrum, over both trochanters, the scapulæ, patellæ, elbows—in short, everywhere. For weeks she lay on her face, till bed-sores formed over the anterior superior spine. I never before saw anybody reduced to so fearful a state through decubitus. Had it not been for a good English water-pillow she must have died. Eight months after her admission she was discharged strong and well. A year later I saw the patient, stout, active, and in good health.

I exerted myself to the utmost to discover some reason for the gangrene in this patient; there were no abnormal symptoms about the heart; the arteries were of normal dimensions and the pulse strong. Both the femoral arteries were pervious down to the ham. Her neighbours said of her, that she drank a good deal. It is true she was in the habit of drinking from two to three "schoppen" of

[1] Cf. a case recorded by Nédopil in the 'Wiener Med. Woch.,' 1878.

Swiss wine daily, but this is nothing out of the way for the country-women, and even if she had been an habitual drunkard, this would not have accounted directly for the occurrence of the gangrene in so many different parts; in short, the etiology of the case is still inexplicable to me.

In spontaneous gangrene the questions whether amputation should be performed, and what is the right time for the operation, cannot be answered in any general way. The cases must be treated according to circumstances. This much, however, may be said—if the gangrene be due to embolism of the popliteal artery, the best chance for the patient will be to amputate the thigh, close above the knee, as soon as the diagnosis is established, for gangrene of the foot and leg will invariably follow.[1] When the gangrene is limited to the toes, it is better not to operate. If the mummification be limited, amputation can be performed through the line of demarcation successfully, if the patient has still strength enough to live for some months or years. A very unfavourable prognosis must be given in moist senile gangrene when the disease extends beyond the toes. Amputation, a little above the line of demarcation in the skin, need not be altogether condemned, but it holds out little prospect of success. In symmetrical gangrene—the result of anæmia—the prognosis is so bad that it is better not to operate.

Spontaneous gangrene.

A man, æt. 55, was admitted with the following history:—For ten years he had suffered from shortness of breath and palpitation of the heart. Five months previously he had experienced a sudden, severe pain in his right leg. On taking off his boot he found the limb white and almost devoid of sensation. Three weeks later, according to his account, "the leg was bluish-black, and the flesh fell away from his bones." The leg was then amputated just beneath the line of demarcation in order to get rid of the stench of the gangrenous parts. From the appearance of the stump and the history of the case, I have no doubt that the gangrene was due to sudden blocking of the popliteal artery, either from embolus or from thrombosis of spontaneous origin. The bones of the leg projected an inch and a half beyond the stump. In order to improve this I separated a portion of the skin from

[1] It may be useful to bear in mind in amputation for this condition, a point that has already been remarked, viz. that if the line of demarcation be allowed to form, it does so at a much lower level over the calf of the leg than over the lateral and anterior aspects of the limb. The posterior flap, therefore, should be the longer.—[Ed.]

the anterior surface, and removed sufficient bone to enable the soft tissues to cover the stump. Unfortunately fresh gangrene followed this operation, collapse set in, and the patient died. Post mortem: the heart was found to be half as large again as natural, the wall of the right ventricle being much thickened; the valves very extensively diseased; the bicuspid valve, together with its chordæ tendineæ, thickened and contracted. On the inner surface of the valves spots of calcification, and in one place an ulcer, the size of a bean, to which loose, fibrinous, vegetation-like coagula adhered. The posterior aortic flap adherent to the left. Both cusps of the mitral valve so adherent that the opening would only admit the little finger.

Meyer W—, æt. 37. Four years previously the patient experienced constant formication, accompanied by some pain and swelling of the left foot. He went on with his work, but four months later a small wound formed and gradually increased, starting from a scratch on the little toe. A year later a similar ulcer formed on the great toe; caustics were applied, and after the separation of the eschar the ulcer resumed its former appearance. The ulceration now spread slowly over the whole foot, destroying first the little and then the great toe. Under long continued rest the ulceration almost healed up; he then began to get about, whereupon the cicatrices again began to break down, and again healed up with rest; so the process went on until the other toes separated, and the soft parts became detached from the metatarsal bones, which, on his admission, were bare and partly covered by osteophytes. The parts about the ulcerated wound were strikingly white and insensitive; the whole appearance of the disease suggested some slow phagedænic process; the thoracic and abdominal viscera were normal, nor could anything be found amiss with the heart or the large vessels. Von Hebra was of opinion that the disease was syphilitic in its nature, although the patient absolutely denied any infection, and no other symptoms of syphilis could be discovered beyond slight swelling of the cervical and cubital glands. Some thought the infection was due to congenital syphilis. Chopart's amputation was performed and inunction employed. The patient improved decidedly, and the wound got well. In six weeks' time he was able to walk well on the stump, and was then discharged. To my regret I could gain no subsequent information about his case.

Anton H—, æt. 33, was stated to have suffered six weeks before his admission from pneumonia of the left lung and pleurisy of the right side. Fourteen days after the commencement of the disease he felt a sudden pain in the great toe of the left foot, and formication in the sole of the foot. Soon after, the entire left lower and the right upper extremity became cold and devoid of sensation. After two days the great toe was noticed to be of a blue colour, and the discolouration gradually spread over the foot and leg. The anæsthesia of the upper extremity disappeared after some days. When admitted the patient was in a very feeble state; the area of præcordial dulness was not increased; a distinct systolic friction murmur was audible. No pulse could be felt in the brachial arteries of the right side nor in the left crural artery; the left leg was gangrenous up to

the knee. The line of demarcation extended lower down over the calf than on the anterior surface. Amputation was performed, but the patient died a month after the operation.

Taking into account all the symptoms I had diagnosed endo-myo-pericarditis, with embolism of the left popliteal and the right subclavian arteries.

From the report of the post-mortem examination I cull the following :— "In the lower lobe of the left lung an infarct, the size of a chestnut, from which a firm clot extended into a large branch of the pulmonary artery; a similar thrombus of the right lower lobe. Hepatisation around the infarcts. The heart presented the results of acute disease and was covered by a reddish fibrinous layer, with here and there some recent connective tissue. The left ventricle was enlarged, and the walls of the septum covered everywhere by irregular thickenings, between which the muscular substance presented a singular appearance. In the trabecular tissue were numerous globular vegetation growths, varying in size from a pea to an almond, some tough, others soft, and of greyish-red colour. The whole length of the right subclavian artery was completely plugged by a thrombus, and the perivascular tissue thickened; the right subclavian and innominate veins were blocked by firm thrombi. It is possible that the emboli in the arteries of the lungs started from the vegetations of the right side of the heart, but it is just as probable that they came from the thrombi in the subclavian or femoral veins. The femoral artery was obliterated by a tough, fibroid clot extending from Poupart's ligament to the amputated surface. The femoral vein was obliterated to some extent."

Embolism of the subclavian artery is not of common occurrence in such cases. I have recorded above (p. 366) a case of embolism of the brachial artery.

A case of senile gangrene in an intemperate old man aged sixty was of some interest, inasmuch as the fingers were affected.

Six months before admission he had suffered from onychia of the right great toe, accompanied by slight sloughing of the skin; the gangrene of the fingers had commenced with onychia of the left index finger six weeks before admission. A fortnight previously the same process began in the right index finger; nothing abnormal could be detected in the arteries, nor was there any symptom of ergotism. He died two days after admission. The post mortem showed evidence of chronic embolism; the arteries of the upper extremity were not abnormal as far as they were examined, but unfortunately the vessels were not investigated minutely up to the fingers.

"Spontaneous gangrene," or, as the older surgeons used

to call it, "gangrene from internal causes," may arise, as we now know, in many different ways. Owing to the researches of Dupuytren, Raynaud, Virchow and others, it is possible to do more than merely distinguish between dry and moist gangrene, and we are now enabled, at the bedside, to make a diagnosis that is accurate anatomically as well as etiologically. The varieties may be classified as follows:

(A) Gangrene from Anæmia. (Asphyxie Locale.[1])

In severe and extensive cases of this nature no good results can be expected from amputation, and if the process be not limited to small parts of the skin, and the gangrenous parts do not come away of themselves, the disease is necessarily fatal. There is probably some affinity between this disease and the affection recently described as anæmia perniciosa.

(B) Gangrene due to Embolism.

In all the cases I met with, the embolism was situated at the bifurcation of the popliteal artery, and arose from endo-myocarditis and valvular disease or some other severe and acute general affection. This form is characterised by (1) its sudden onset; (2) by pain, usually severe and frequently noticed from the second to about the sixth day; the limb at first becomes white, and devoid of sensation but with formication, then livid and painful; (3) by the gangrene occurring simultaneously over the whole foot and leg, the foot as a rule, being mummified, while at the limit of the circulation the gangrene is more moist in character; (4) by the shape of the line of demarcation, which appears anteriorly as a transverse line close under the tuberosities of the tibia, and at the back marks out a flap three or four inches long over the calf.

In such cases, amputation of the thigh is the best treatment, and should be performed as soon as the diagnosis is established.

[1] 'De l'Asphyxie Locale et de la Gangrène Symétrique des Extrémités,' Raynaud, 1862.

(c) Gangrene from Hyperplastic Endarteritis.

I first became minutely acquainted with this disease through the writings of Felix v. Winiwarter ('Archiv für Klin. Chirurg.,' Bd. 23, p. 202), who points out that hyperplastic endarteritis (endarteritis and endophlebitis proliferans) may occur in apparently healthy individuals, and leads to the formation of thrombi, which become organised and vascular; the variety cannot be diagnosed without the aid of the microscope. Syphilis or alcoholism may give rise to this form of endarteritis. It is doubtful whether the gangrene arising in cases of diabetes mellitus belongs to the same category. The affection requires further investigation; usually there are prodromal symptoms extending over periods of some years, such as weakness of the circulation, mottling of the skin over the joints, sensations of cold, formication, inability to stand long, or to walk far; some accidental contusion or cut leads first to atonic, and then to sloughing ulceration. The gangrene progresses very slowly, and is usually moist; it is generally accompanied by severe pain and chronic septic symptoms. There is some risk in waiting for the line of demarcation, for the gangrene is apt to commence anew after the demarcation has apparently been established. It is best to amputate at some distance above the gangrene, as soon as the diagnosis is made.

(d) Gangrene from Atheromatous Arteritis; Senile Gangrene.

This form occurs principally in males; slight injuries, such as pressure from a boot, or inflammation about the nails, are frequently assigned as the starting-points; the disease commonly begins with a circumscribed stasis, and formation of blebs containing sanious fluid, on either side of the toes. Evidence of chronic alcoholism is frequently discovered post mortem. Anatomically as well as clinically, these cases may be divided into two groups.

(1) Thrombosis arising from aneurism of the femoral or popliteal artery, which commences gradually and finally becomes complete.

(2) Gradual thrombosis of the smaller digital arteries, with progressive gangrene; this form may begin over the distribution of the dorsalis pedis or the posterior tibial artery. The ages of the

patients who came under my observation, varied between fifty-two and eighty-two. Many of the patients were of dull intellect; atrophy of the brain and atheroma of the cerebral arteries were often found, though not in all instances. A dry form of gangrene —mummification—is the common form; this is due to the fact that the circulation is not suddenly arrested, nor the fluids in the tissues completely imprisoned; the obstruction takes place gradually, and the fluids are carried away by the veins and lymphatics; for this to take place, some, however slight, arterial circulation is necessary. When mummification of the leg follows embolism of the popliteal artery, either the plug cannot have been complete at the outset, or else feeble collateral circulation must have gone on. If the circulation be suddenly and totally arrested, decomposition and moist gangrene must follow, as observed in gangrene due to traumatic causes, or to frost-bite. This kind of moist gangrene (sphacelus) differs materially in its origin from the moist gangrene which is due to intense inflammation of the part. This latter form is well described by the old name of warm gangrene (heisser Brand).

We are never able to predicate the duration of senile gangrene, or the probable limit of demarcation with any degree of certainty. In the cases that I have met with, the duration of the process up to the spontaneous separation of the gangrenous parts, or till death, varied between a month and two years. This is as distressing for the surgeon, as for the patient. In senile gangrene no general rule can be laid down as to when or where we should amputate. In general, so far as I have seen, the results of the regulation expectant treatment are so unfavourable, that I have determined in future, to amputate at an earlier date at the foot, or above the malleoli, unless the patients be too much reduced. Possibly our new methods of treating wounds may bring about more favourable results than our predecessors were able to achieve.

Gangrene after typhus.

Wolf B—, æt. 26, had an attack of typhus nine weeks before admission; during the third week of the disease, according to his statement, dark discolouration began in the leg and gradually spread over the toes, commencing at the great toe. In the seventh week, the limits of the gangrene first became defined; the pain and fever then ceased, and when the patient was admitted

he was fairly strong. The line of demarcation was situated in the upper half of the leg, sound skin extending to a lower level on the posterior than on the anterior part. The leg and foot were in a state of mummification, and at the line of demarcation the bones were completely denuded to the extent of an inch. The bones were sawn through subperiosteally an inch and a half above the line of demarcation, and flaps fashioned from the living soft parts. With the exception of a slight attack of lymphangitis, he made an uninterrupted recovery, and had a good very stump.

This was a typical case of gangrene—the result of thrombosis after typhus—of the kind described by Estlander in the 'Archiv für Klin. Chir.,' Bd. xii, Heft 2.

Ulceration of the leg. Lengthening of the limb.

Josepha R—, æt. 13, a very neglected child, suffered from gangrenous ulceration of the leg, which was treated by the application of fuming sulphuric acid. Exfoliation of the tibia followed and the patient recovered. The affected limb was about a centimètre and a half longer than the sound one.

Ulceration of the leg.

A man, æt. 56, came under treatment, who twenty-six years previously had been struck on the right leg by a falling tree; the injury was followed by considerable cellulitis, and some destruction of the skin. The resulting cicatrix had ever since been weak and imperfect. After a time, all the integuments of the leg and the foot became thickened, and assumed a condition of elephantiasis. From the knee to the foot, all the tissues were extensively degenerated and ulcerated, and had been so for many years; the fœtor of the ulceration was abominable. Fomentations, compresses, digital compression of the femoral artery, and many other remedies were tried in vain. Finally the limb was amputated, close above the knee, by means of an anterior flap. The parts healed up remarkably favourably, but twenty-three days after the operation the man was suddenly seized with a rigor, and the stump became blue, swollen and painful; three days later complete gangrene followed, collapse set in and the patient died two days after the rigor. As we had been led to expect, the heart was found to be fatty and the femoral artery thrombosed.

Periarticular Abscess of the Knee.

In the early stages of this disease, the diagnosis is not always perfectly easy, though it soon becomes established by the absence of any loss of function in the joint. In none of my cases was the

knee-joint affected at the same time, a point of interest, inasmuch as disease of the joint (whether acute or chronic synovitis) so frequently causes periarticular abscesses of the cellular tissue. I suspect, from the mode of extension of the inflammation, that the phlogogenous materials pass along the lymphatic channels into the tissue.

Acute inflammation of the knee.

A youth, æt. 16, received a blow on the knee three days before admission. For two days he followed his employment, but then, on account of the great pain in moving about, sought advice. The patella was distinctly raised by the effusion; the swelling of the part readily diminished under treatment, so that in eight days the patella had subsided to its normal place, and the abscess which existed seemed to be solely periarticular. The pus was let out by means of a trocar; although no air was allowed to enter, the puncture was followed by a high degree of fever. Eventually a free incision was made, a quantity of foul pus evacuated, and the feverish symptoms subsided. Recovery followed in thirteen weeks.

Probably in this case the acute inflammation of the joint set up the periarticular abscess, and it is possible that there was no perforation of the capsule.

Acute Periostitis and Osteomyelitis.[1]

Acute periostitis and osteomyelitis of the femur.

A boy, æt. 8, was admitted with subacute osteomyelitis and osteoplastic periostitis of both femora, which had originated without any known cause. On the right side the upper epiphysis had become softened and detached without any suppuration and led to the spontaneous dislocation which was evident. This was reduced, and the limb put up in a plaster bandage. He was under treatment in the hospital for seven months, and subsequently recovered so far that he could jump and run without pain or limping.

Acute periostitis and osteomyelitis of the tibia.

A girl, æt. 14, had a very acute attack of periostitis of the tibia, together with acute inflammation of the ankle-joint. The anterior surface of the tibia was completely exposed. In the course of a few weeks she had altogether sixteen rigors. I diagnosed osteomyelitis with periostitis;

[1] See Appendix II.

recovery however, eventually took place, and only a few small portions of bone became detached from the anterior surface of the tibia.

I suppose, judging from the result, that the case was one merely of periostitis, or at any rate, that the medulla of the bone, though it may have been inflamed, was not suppurating—otherwise, complete necrosis of the shaft must have followed. The sinuses did not completely close for two years. The girl recovered perfectly, and there was no shortening of the limb.

A boy, æt. 13, came under my care who, from the accounts given, had been attacked with acute osteomyelitis accompanied by extensive sloughing of the skin, a year previously. The bone became spontaneously detached at the upper and lower epiphyses. The suppuration was so great that the whole shaft was removed, although there was but little new formed periosteal bone. Pseudarthrosis, in consequence formed; this was cured by uniting the ends of bones with sutures, and driving in ivory pegs. The tibia recovered its normal size, and the growth of the limb was not interfered with. The patient was in perfect health and strength.

Attention has been repeatedly called, of late, to acute osteomyelitis, occurring where there has been no breach of surface. Formerly, the disease was not universally recognised, partly because in making post-mortem examinations in such cases the affected bones were not sufficiently examined, and the anatomical features of the disease, therefore, imperfectly understood, and partly because, in many parts of Germany the disease is of comparatively rare occurrence. For instance, in Vienna, this affection is seldom met with, and during the seven years that I was assistant, I can recall but few cases; they were more numerous in Zürich, and I heard of many which were met with in Berne; von Langenbeck has remarked on the frequency of such cases at Kiel. The comparative rarity of the disease in some places, and its frequency at others, is only apparent; the necroses of the femur and end of the tibia, which are common enough at every hospital, and of which numerous preparations are to be found in every pathological museum, are mostly the result of acute or subacute osteomyelitis. We must take into consideration the fact that patients suffering from acute osteomyelitis cannot be easily moved, and content themselves in consequence with such treatment as they can obtain at home, in preference to undertaking a long journey to a hospital. The frequency of cases of necrosis proves, moreover, that the disease often

terminates spontaneously in recovery, or that the patients very frequently survive the acute stage. The great mortality in hospitals among this class of cases may depend upon special conditions, such as, possibly, septic infection supervening after incisions have been made.

From what I know now of the disease, I see that many of the cases which were entered as acute inflammations of the joint should have been classified with those now under consideration. Of such a nature was the following:

S—, æt. 19, had an attack of acute articular rheumatism, which she got over without any ill effects. Eight days before admission, the right elbow became painful and moderately swollen; ice was applied. A peri-articular abscess formed, which was opened four weeks after admission, and it was soon evident that the abscess communicated with the joint. A month later there was grating of the articular extremities, and I excised the joint. The suppuration was profuse and the pus ichorous. Further incisions were found necessary and the patient died of pyæmia, after amputation of the arm, three months after her admission.

No cause was assigned for the commencement of the disease. I think it very probable that there was acute osteomyelitis of the lower end of the humerus.

The femur was affected in twenty-four cases (males 17, females 7). Eighteen of these patients died. In this category can be included nine undoubted cases occurring in males—aged respectively 8, 16, 17, 18, 22, 29 (2), and in females of 12 and 26. In the following case the lower epiphysis was detached.

T. H—, æt. 18, a locksmith, was attacked with severe rigors, vomiting, and pain in the right knee of so intense a nature that he could not stand. When admitted, two days later, the presence of acute osteomyelitis was already unquestionable, and it soon became still more marked. The general condition was so typically typhus-like that for the first time on seeing this case, I understood why this disease has been designated "bone typhus" (Knochentyphus). The pains, which were especially severe at night, were relieved by morphia injections. Eight days after the commencement of the disease, fluid was detected deeply situated about a hand's breadth above the knee-joint. I made an incision with a long, fine knife, and let out some pus mixed with dark blood; the pus was inodorous and free from bacteria; at the same time I felt the bone denuded of periosteum. I did not enlarge the opening, but ordered wet compresses to be constantly applied and allowed the secretion to drain away spontaneously. The puncture soon closed, but three days later I was forced to extend it for about three inches, and a large

drainage tube was inserted. The pus had now an acid smell. Nine days after admission he had repeated attacks of severe dyspnœa and cough. Neither in the heart nor in the lungs could anything abnormal be detected: probably the symptoms were due to fat embolism of the lungs. During the tenth and eleventh days the swelling of the edges of the wound diminished and the patient was relieved; the tongue became more moist, and the appetite improved, although the evening temperature still kept high, and the pus had a foul smell. A slight bed-sore formed over the sacrum. By the sixteenth day the attacks of dyspnœa had left him, but swelling of the knee-joint was observed. On the nineteenth day the lower epiphysis of the femur was found loose. From this time the patient began to improve; the bed-sore healed and the fluid in the joint became absorbed. By the twenty-seventh day the fever had ceased. On the fifty-seventh day—the thirty-fifth after the detachment had been noticed—the epiphysis was found to have consolidated again. About five months after the commencement of the disease, a sequestrum was removed, and when the patient was discharged a short time after, the sinus had not completely closed. He had some movement in the knee-joint. It is much to be regretted that the subsequent accounts of this characteristic case are imperfect.

In the following case also the lower epiphysis of the femur became separated.

Elise W—, æt. 12, had intensely acute suppurative osteomyelitis and periostitis of the femur, followed by abscess of the knee-joint and separation of the lower epiphysis of the femur. Subsequently osteomyelitis developed in the tibia on the same side; the femoral vein was blocked up to the vena cava. She had phlegmasia on both sides; no metastatic abscesses. Death on the sixty-third day. The cause of origin of the disease could not be made out.

Subacute periostitis of the femur.

H. B—, æt. 24. Five weeks after the pain had first commenced an abscess was opened. The bone was not necrosed. A sinus persisted at the site of the abscess. When discharged two or three months later he could walk well, and the suppuration was very slight.

Acute ostitis.

Moritz S—, æt. 22. Eight years previously (when fourteen years of age) he was attacked with acute ostitis of both femora, after a severe chill; both humeri were attacked also as well as the right tibia. Abscesses and sinuses formed over all four extremities. The sinuses in the upper extremities closed spontaneously without any exfoliation of the bone, and those over

the tibia healed after the separation of a portion of bone. When he was admitted the only sinuses open were in the thighs. On the right side a sequestrum and an old drainage tube was removed; on the left side only a drainage tube. The sinuses closed up soundly and the patient was discharged in a month.

In the next case, the osteomyelitis was of a subacute character. It was found necessary to amputate at the hip-joint, and the patient did not survive the operation.

Franz T—, æt. 17, had a fall from a horse three years before I saw him, and his left knee became swollen and painful. He kept his bed for a month, and all the pain ceased. He then was put to a locksmith's trade, and had to work the bellows with his left leg. Eight days before admission he was seized with rather sudden, severe pain in the left leg, and symptoms of subacute osteomyelitis, principally in the lower half of the left femur, soon after manifested themselves. At the end of three weeks fluctuation was sufficiently distinct for me to make a puncture with a fine knife. A large quantity of pus escaped which was free from smell. The patient was much relieved. Subsequently the suppuration extended into the deeper parts, and numerous fresh incisions were found necessary. A large extent of the bone lay bare; the amount of suppuration became prodigious, and although the patient had but little fever, his strength sank so rapidly that on the ninety-eighth day of the disease, I decided to amputate at the hip-joint. Shortly before the operation he was ordered a beef steak and some wine. Every precaution was taken to guard against loss of blood. The patient was only slightly anæsthetised; the pulse could only be felt in the carotid artery. I began by ligaturing the femoral artery; then encircling the thigh close below the trochanter with the galvano-caustic loop, I cut through the soft parts down to the bone. Absolutely no blood was lost. I had made a longitudinal incision above the trochanter, and was preparing to separate the bone when the patient became suddenly collapsed and died.

The following case may be distinguished from the two preceding examples of osteomyelitis, inasmuch as the bones were already altered by chronic disease.

L. M—, æt. 22. When a child, he suffered from inflammation in the right knee which left the joint contracted. The deformity was gradually cured by repeated forcible extension. Fourteen days before admission he had pains in the right femur which rapidly grew worse. Subacute ostitis developed, and an abscess formed over the left side, which was opened and drained. A tolerably large extent of bone including almost the entire circumference lay exposed. The suppuration lasted a long time, but no necrosis followed; the soft parts again sank back on the bone, and the abscess closed completely. In about three months the patient had recovered with a perfectly useful limb.

The next case is of special interest, inasmuch as the disease extended from the tibia to the femur and pelvis, and affected also other parts.

Anthon G—, æt. 12, was attacked suddenly one day with severe pain in the left leg, so that he was unable to stand. He was feverish, but the disease did not begin with rigors. Swelling of the left leg and knee-joint was soon observed. The application of some iodine caused extensive vesication, but the patient's condition became worse and worse. On the twelfth day an incision was made just below the knee-joint on the anterior surface of the tibia and some sanious pus let out. During the next few days, swelling was noticed over the lower end of the femur. A fortnight after admission he spat up some clotted blood. This symptom did not occur again and nothing abnormal could be detected in the chest. The incision over the tibia was enlarged, but although the discharge was free, neither the swelling of the knee nor that of the thigh decreased. Between the twenty-second and twenty-fifth days the knee-joint was washed out three times. On the first occasion the pus was serous, inodorous, and contained numerous strepto-cocci; on the second occasion there were fewer cocci, while on the third puncture the pus was thick, and quite free from cocci. It was evident that the lower end of the femur was attacked with osteomyelitis, and on the twenty-sixth day amputation was performed through the middle of the thigh. The child was in a high state of fever at the time of operation. On examining the amputated leg, the upper end of the tibia and the lower end of the femur were found infiltrated with pus, but the articular cartilages were to all appearance intact. The sawn surface of bone was healthy. Undoubted symptoms of osteomyelitis now made their appearance in the stump, and the pain and swelling extended up to the pelvis. Amputation at the hip-joint was out of the question for there were signs of suppuration in the opposite thigh as well as in the hip-joint. He died on the forty-eighth day of the disease. At the post-mortem we found osteomyelitis in the stump of the femur, the anterior part of the pelvis, and the upper portion of the right femur. The process had extended up from the left thigh, and the affection of the joints must be accounted for by extension through the lymphatics of the capsule and the periosteum.

A few infiltrated spots were found in the lungs, but they were evidently so recent that they could scarcely have had any connection with the hæmoptysis which had occurred a month previously. In all probability this symptom was accounted for, as in the preceding case (T. H. *supra*, p. 415), by fat embolism of the pulmonary capillaries.

Among thirty cases a definite cause was assigned in two only; in one instance, chronic disease of the thigh had existed previously. The patients, as a rule, were young, from eight to twenty-nine years old, as my tables show. I have met with acute osteomyelitis,

both at Berlin and Vienna in children a year old; the mortality is very high when the disease occurs at more advanced periods in life. The acute infection in this disease, seems to have struck the old observers, when they named the infection, "bone-typhus" (Knochen-typhus).[1] Rose has already pointed out its possible etiological relation to acute articular rheumatism; his proposed term "pseudo-rheumatic" inflammation found, however, but little favour. I will not now speculate on the locality of the nidus of infection; I will only now say, that it is still premature to imagine that the infecting matter is always associated with cocco-bacteria.

It is extremely difficult to decide the point, for these vegetations —although they may be truly the causes of the inflammation, and although they may be invariably found in the tissues at a time when there is no communication between the air and the seat of inflammation—perish as soon as the secretion of pus is considerable, as I have already pointed out. The cases are still few in number in which undoubted cocco-bacteria vegetations have been shown to exist in quite recent acute subcutaneous inflammation. It is by no means proved that these vegetations do not only occasionally develop in such vegetations; for we must remember that fungi—directly capable of development—which are taken into the circulation through the lungs, might be present at the seat of inflammation and as the products of inflammation take up a great quantity of oxygen, there is, as it were, a soil particularly well adapted for the development of any kind of vegetation. If such an area of inflammation is brought, though only for a moment, into contact with the air, let the opening be spontaneous or artificial, then the fact that cocco-bacteria are found in the exudation, ceases to be a proof of any etiological relation between these vegetations and an acute inflammation.

On the whole, I am inclined to the belief that most of the spontaneously arising inflammations originate in peculiar fermentative processes in the tissues, but my observations at the bedside have not led me to conclude that the ferment must of necessity be of a vegetable or an animal character; it is established beyond doubt, that acute progressive septic inflammations can only be produced by inoculation, when the inoculated matter contains cocco-bacteria; further, that inoculation with septic matters not containing cocco-bacteria produces only symptoms of a more or less transient

[1] Using the term "typhus" in its Hippocratic sense.

character.[1] So far as I know, no systematic observations have hitherto been made at the bedside in other hospitals, of the same nature as mine. Neither on theoretical, nor on practical grounds, can any advantage be derived from promulgating hypotheses, founded on our present information. These matters must be attacked by new methods, and new lines of thought, and from new points of view; the work that has hitherto been done on this subject, is, in my eyes, simply little more than a feeble commencement.

To return to the subject of osteomyelitis; with regard to the symptoms, I may add that lethargy, profuse diarrhœa, and the early occurrence of bed-sores seem tolerably regular in their occurrence. A slight degree of icterus is frequently met with and in many cases temporary attacks of dyspnœa associated with considerable hæmoptysis, probably due to fat embolism in the capillaries of the lungs and liver. This latter lesion occurs, as is known, after compound fractures, but it may also take place where the bones are deliberately fractured, as will be shown hereafter. The process is due to rapid breaking down of the fat cells of the medulla, while the increased intra-ossal pressure favours the passage of the fat cells into the medullary veins.

In the matter of treatment, I have come to the conclusion, that it is best to wait till fluctuation is distinct, and then to make a fine puncture down to the bone: by thus letting out some of the effused fluid, the tension and the severe pain are relieved. The puncture has little influence in limiting the necrosis that follows, for, although the blood circulates more readily after the effused fluid is withdrawn, yet the delimitation of the necrosis is commonly laid down by the time abscess forms. Formerly, much difficulty was experienced in allowing any further effusions to escape readily after puncture, and in guarding against decomposition in retained fluid. Now-a-days, however, with drainage tubes, and modern antiseptic dressings, we may hope to obviate these sources of danger to some extent; it is of the utmost importance to the patient that we should do so. The drainage tubes have to be carried through the thick muscular coverings of the thigh; unless numerous drains be kept in, the muscles will close up, or so bulge forward through the splits in the fascia, that the decomposing

[1] Cf Mikulicz in the 'Archiv für Klin. Chir.,' Bd. 22, p. 253.

effusion will be unable to escape; many, many cases of necrosis of the leg and thigh, came before us, which were treated without the hospital by small incisions usually made when the abscess was almost breaking on the surface. The medical attendant probably feared the hæmorrhage which must inevitably result from long and deep incisions in the thigh. This only shows, as already remarked, that osteomyelitis frequently runs its course to a favourable termination with little or no help from the surgeon. Bearing this fact in mind, I only counsel amputation in the most extreme cases; but little hope of recovery can be entertained from amputation, for the disease has a tendency to progress, and the operation has little power to check this tendency. I have recorded a case above (p. 413) where a girl, æt. 14, recovered after having fourteen rigors. The patient had to thank my colleague Thiersch for the preservation of her limb; amputation, to my mind, offered her the only chance of life.

I have never observed relaxation of the ligaments after osteomyelitis, often as I have seen the joints affected in such cases. Slight lengthening of the limb, owing to excessive growth of the affected bone, was common enough.

Reckoning the total number of cases which came under treatment between 1870 and 1876, and including those entered as "necrosis," as cases of osteomyelitis in which recovery had taken place, I find there were twenty-three in the upper and sixty-six in the lower extremity. Unfortunately, in the earlier cases the records do not show minutely that acute osteomyelitis was always the cause of the necrosis; but I do not think that I go too far, if of the eighty-nine cases I take fifty and reckon them as acute and subacute osteomyelitis; excluding acute osteomyelitis of the articular ends of the bones, which probably were classified as acute inflammations of the joints, I have a sum total of sixty-six cases of acute and subacute osteomyelitis ending in recovery. Although I cannot from my figures, estimate the exact rate of mortality in this disease, I may say this much—that the number of cases of acute osteomyelitis which recover, is by no means so small as would appear from clinical observations alone. The disease is far more common in the male sex; of the eighty-nine cases of necrosis, only seventeen occurred in women. It is difficult to say to what cause this enormous difference should be attributed.

The patients often stated that the disease followed typhus fever.

Such accounts should be received with caution when we remember that acute osteomyelitis, as already remarked, often exactly resembles typhus in its symptoms. I may repeat here a remark which I have already made, viz. that the occurrence of dislocation of the hip after typhus, may well be doubted. It is not unlikely that the condition may be really due to osteomyelitis of the upper end of the femur without suppuration, followed by separation of the epiphysis, and displacement of the shaft of the femur backwards; the lateral decubitus of these patients, and their habit of lying with their limbs flexed, favour the displacement, for bed-sores often form so early that they avoid lying on their backs.

In the following case the whole length but not the whole thickness of the tibia was affected.

C. F—, æt. 14, had recovered from an attack of typhus some months before admission. Three months before I saw him acute osteomyelitis with suppuration developed in the right tibia. Most probably, therefore, the osteomyelitis developed spontaneously with typhoid symptoms. When I saw the boy, there was complete necrosis of the right tibia with separation of the upper epiphysis. He had also suppuration of the knee-joint, a large abscess on the outer side of the thigh, which was on the point of bursting, and was in a high state of fever with commencing septic symptoms. The abscess of the thigh was opened, the knee-joint drained, and a sequestrum removed from the tibia. He died about a fortnight later. No metastatic disease was found post-mortem nor was there any purulent osteomyelitis of the femur, so that the origin of the large supra-fascial abscess mentioned was not quite clear.

Osteomyelitis of the tibia.

A man, æt. 59, over whose leg the wheel of a waggon had passed, was admitted with an incised wound, two inches long, over the middle of the shin. The inner surface of the tibia was slightly depressed, but the bone was not broken. For the first few days the fever and swelling were considerable, but for twenty-four days he went on well; some swelling then began on the inner side of the calf, which suppurated, and rendered an incision necessary. The inner surface of the tibia was then found to be completely denuded of periosteum; thrombosis of the saphena vein followed, and repeated rigors. Death from pyæmia. Osteomyelitis of the tibia, suppurating thrombosis of the femoral veins and suppuration of the knee-joint were found post-mortem, together with abscesses in the lung.

The age of the patient is a point of some interest in this case.

Osteomyelitis and periostitis of the femur.

A boy, æt. 17, was admitted, who could give no accurate history of his complaint, but some old, deep cicatrices were found on the left thigh. On admission, the whole of the external aspect of the left thigh was enormously swollen, and the muscles raised up by fluid. The patient was feverish. The swelling was punctured with Dieulafoy's aspirator, and the febrile symptoms decreased. Subsequently two incisions were made, and an immense amount of foul pus, containing gas, evacuated. A great part of the femur was bathed in ichorous matter, but nowhere exposed. This condition did not improve, though the wound was washed out many times daily with carbolic lotion. The weak condition of the patient, and the doubtful existence of osteomyelitis, indicated amputation of the hip. Death from septicæmia. Post mortem: the femur was found denuded of periosteum at one point; the medulla was discoloured, and studded with purulent deposit; pus was found in the knee-joints.

Ostitis of the femur.

D. F—, æt. 55. In this man the disease had commenced five months previously, without known cause, with pain in the knee. An abscess formed over the lower end of the femur, which broke after six weeks and healed up. Seven weeks before admission, a similar abscess formed over the upper end of the femur which also healed up. When I saw the patient there was a large cold abscess over the trochanter major, and the whole extent of the bone was markedly thickened. The abscess which was supra-fascial but ran down deeply, was opened, and the cavity stuffed with charpie. Symptoms of acute osteomyelitis followed with effusion into the knee-joint, and the patient died of erysipelas and pyæmia. Post mortem: the upper part of the femur was bathed in pus; pus also in the hip and knee-joints; the entire femur thickened.

This, therefore, was a case of chronic ostitis affecting the upper end of the bone, which took on a very acutely infecting character after the incision.

Anton D—, æt. 17, was stated to have suffered from acute articular rheumatism, seven months before admission; the affection of the right hip-joint proved especially obstinate. The youth was strong and well-nourished. Over the right trochanter was a large abscess, on the point of bursting, which was opened under antiseptic precautions. The discharge shortly afterwards became foul and high fever was manifest. The abscess was then freely laid open, and its walls scraped; the surface of the trochanter was denuded of periosteum. Notwithstanding a free use of carbolic lotion, decomposition

went on in the wound, and the patient died of pyæmia. Post mortem: metastatic abscesses in the brain and lungs, and purulent thrombosis of the right femoral vein. A small cavity was found in the upper end of the shaft of the femur filled with pus and broken down granulations, and containing a sequestrum. A narrow track connected the cavity to the larger abscess.

Evidently in this case, the symptoms which were supposed to be due to acute articular rheumatism, were the result of subacute, circumscribed osteomyelitis, which ran on to central necrosis.

Michael W—, æt. 22. Eleven years previously without known cause, he was attacked with severe pain in the right leg (probably due to acute osteomyelitis). A year later, an abscess formed over the inner side of the thigh and was followed by others on the anterior surface of the leg. Some ulceration about the parts was thought to be possibly due to congenital syphilis. The sinuses had never closed since their formation but no bone had come away. The sinuses were laid open, and found to lead down to a cavity filled with granulations which were scraped away; the walls of the cavity were of ivory hardness. The sinuses closed in five months.

The most interesting point in this case was the marked lengthening of the affected extremity; the lower two thirds of the femur, and the upper two thirds of the tibia, were considerably thickened. The lengthening of the femur amounted to four centimètres and that of the leg was the same.[1] (See Plate IX).

Very chronic periostitis and osteomyelitis.

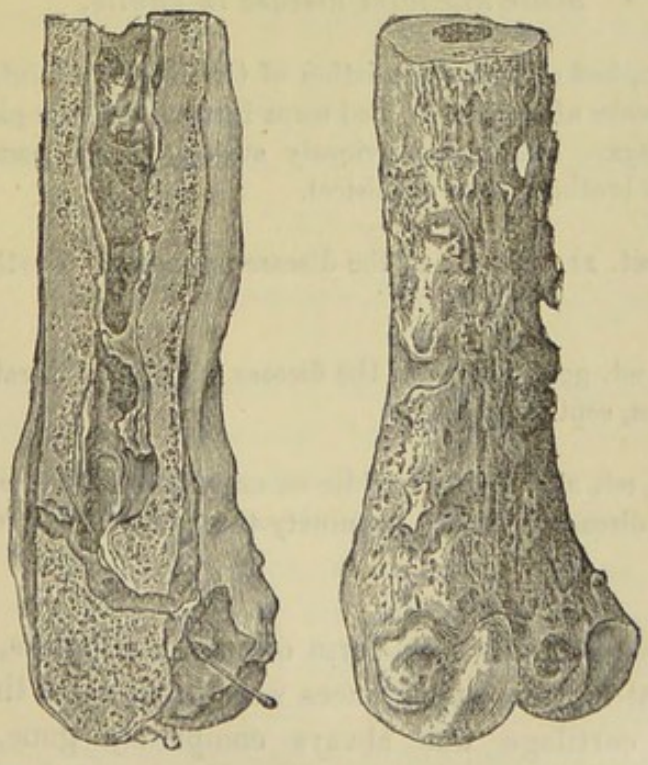
A man, æt. 54, was admitted with the following history:—Forty-two years previously he fell heavily on to his right knee. Great swelling of the right knee and thigh followed, and he had to keep his bed for three months. He recovered sufficiently to walk about, but the knee never became quite straight and remained painful and swollen. Eight years after the injury an abscess formed at the lower part of thigh; the sinuses which resulted were still open when he came under my treatment. In spite of the fact that the suppuration was very considerable from no less than four sinuses, the patient's strength had not materially suffered, His lungs and kidneys were sound, although the disease of the bone had existed for forty-two years, and suppuration had gone on for thirty-four. The external appearance of the limb most strongly suggested necrosis about the popliteal space; the sinus on the inner side of the femur led down to hard, smooth bone, which however was not loose. I cut down on the inner side of the thigh, but found that

[1] Cf. a case recorded by Mr. Day, in the 'Chir. Soc. Trans.,' vol. ii, p. 104; and in vol. xi, p. 214. [Ed.]

there was no sequestrum; the probe struck against a sclerosed layer of osteophytes; I amputated about the middle of the thigh, but found on sawing through the bone, that the medullary cavity contained pus; this, however, only extended for a quarter of an inch above the section, and I therefore washed it out. The flaps united by first intention, but two sinuses were left, one on the outer and one on the inner side of the wound, which led down to the medullary cavity, from which cavity no proper granulations sprung up. Eventually, after removing subperiosteally an inch and a half of the stump of bone, the parts were induced to heal.

The preparation—a most interesting one—show that the symptoms had been due to an exceptionally chronic process of osteoplastic periostitis, with chronic suppurative osteomyelitis. The osteomyelitis showed no tendency to heal, although numerous openings connected with the medullary cavity had formed externally. The medullary cavity itself, was invested by a tolerably tough pyogenic membrane. (See Fig. 21).

FIG. 21.—LOWER HALF OF THE FEMUR, AFFECTED WITH VERY CHRONIC OSTITIS AND OSTEOMYELITIS.



Very chronic ostitis after fracture.

A man, æt. 44, had sustained a compound fracture of the right tibia thirty-five years previously; numerous small sequestra came away during the year

subsequent to the injury. Many years afterwards, other small abscesses and sinuses formed about the seat of fracture, which were still suppurating when he was admitted. Most careful examination failed to detect any sequestrum. Some improvement followed cauterisation of the sinuses.

SECTION C. ACUTE AND CHRONIC INFLAMMATIONS OF JOINTS.—*Acute hip-joint disease in adults—Cases and remarks. Remarks on chronic hip-joint disease. Case in which forcible extension was applied. Tumor albus of the hip. Cases of ankylosed hip; treatment by osteotomy and fracturing neck of femur. Dislocation of hip after typhus—Case. Case of pathological luxation of hip. Chronic inflammation of knee. Cases of ankylosed knee; treated by forcible extension; by osteotomy. Tumor albus of knee. Case of acute meningitis after excision. Hydrops genu. Cases of loose cartilage. Chronic disease of ankle and tarsus.*

Acute hip-joint disease in adults.

A girl, æt. 20, had acute inflammation of the left hip-joint, which commenced three weeks after a fall. Bed sores formed, and the patient died in eighty-seven days. She had previously suffered from hæmoptysis; her mother and two brothers were phthisical.

Rosine L—, æt. 22. Origin of the disease unknown. Death in forty-nine days.

Agatha B—, æt. 39. Origin of the disease unknown. Death in fifty-two days. Bed sores, septic fever.

Gottlieb S—, æt. 21. A chill, while on military service was given as the origin of the disease. Death in ninety-three days from decubitus and pyæmia.

This acute and rapidly fatal form of coxitis in adults, was new to me. The post-mortem appearances were in all cases the same, viz. the articular cartilage was always completely gone, sometimes hanging in shreds to the bones. The disease consisted essentially of subchondral ostitis with softening and necrosis of the cartilage, and was almost entirely unaccompanied by suppuration. Scarcely a drop of pus escaped from the joint in these cases; there was

very little destruction of the bones, though the medulla was very red. The capsule of the joint was slightly thickened and the synovial membrane very œdematous and swollen. This formidable disease is characterised by intense pain on attempting any movement, but without any tendency to flexion of the limb, which indeed, is kept in the extended position, rapid emaciation of the whole frame, and a great tendency to decubitus.

The diagnosis of this severe form of ostitis affecting the head of the femur is always difficult, and it requires indeed great sagacity at times to distinguish the condition from acute synovitis. It is on this account that I have never attempted resection in these cases, though the operation is clearly indicated. By the time that I had ascertained beyond doubt that severe disease of the joint existed it was usually too late for excision, for collapse set in very quickly in these patients.

I am unable to explain precisely why death took place; it was not from cachexia or exhausting discharges (Säfteverlust), nor was the pain sufficient to account for the result. Rest by means of a plaster bandage, or opium would have controlled this. The post-mortem examination showed nothing; although rigors sometimes occurred, yet no signs of metastatic inflammation could be discovered. I cannot but think, therefore, that the rapidly fatal issue is due to phlogistic infection, starting from the affected joint.

Chronic Hip-joint Disease. (Z. B).

A table of sixty-two cases of this affection will be found in the Zürich 'Bericht,' pp. 500, *et seq.* 34 were males, 28 females; excision was practised in six cases. No fewer than twenty of these patients died from one cause or another, such as lardaceous disease, marasmus, meningitis, pyæmia or measles. These results are, to my mind, very unfavourable, but there is only one way in which they can be improved, viz. by the patients coming under treatment directly the disease originates. In private practice, among the more educated classes we shall be able gradually to effect this, but not among the children of the labouring population. In a working man's family a sickly child is a terrible burden, and as long as a child suffering from hip-joint disease is able to get about, he is allowed to do so; it is only when the pain becomes so great that

he has to lie up, or when, from the flexed position of the limb he is unable to get about, that the surgeon is consulted. Complete rest may be enjoined, but even with the best intentions we find it in many families impossible to ensure this condition, for a sick child kept in bed requires the constant supervision of an adult. Finally the parents make up their minds to bring the child up to the hospital. Now, if the hospital be wholly, or in part, arranged for the reception of children treatment may be very efficient; but if the child be placed in a ward with many other patients, the effect on him may be highly injurious. Young children bear a transplantation of this nature but ill, and are less able to stand a prolonged residence in hospital than adults. How often has it been my lot in Zürich to see patients, who, by means of good food and nursing in the well-arranged and airy Zürich hospital, became certainly somewhat fatter, but yet continued pale and sickly. If discharged and sent back for a time to a wretched home and poverty, where the conditions seemed far less favourable than in hospital, they nevertheless frequently came back to me after but a short time with healthy colour and in good spirits. Although the causes cannot be traced, this ill effect of living in hospitals, which is not absent from even the best arranged institutions, shows its influence especially on children. To keep little ones suffering from joint disease in hospital for months at a stretch must always be of doubtful benefit to them.

The usual well-known remedies should be employed which tend to improve the strength and the general condition, but the main treatment resolves itself into rest, and keeping the leg extended. When the limb is in good position and shows no tendency to alter for the worse, no special apparatus is required, beyond one or two sand bags laid along the leg and foot so as to prevent movement. If in (florid) coxitis the thigh is flexed in an abnormal position, it may either be forcibly restored by traction, or slowly remedied by extension. Both methods have advantages and disadvantages and are applicable to different cases. If under an anæsthetic, the thigh falls of itself into a tolerably natural position, and offers no resistance, the contraction of the muscles is only due to the pain. In such cases it will usually be found best, while the patient is still under the anæsthetic, to put the limb in a wire splint and plaster bandage. For the latter to be really effectual, it should reach from close above the ankle to the perineum, and

should encircle also the pelvis; even then, when the parts about the joint, especially at the back, are very painful, the patients manage to move in the apparatus and raise up the affected half of the pelvis, drawing it over to the sound side. This can only be prevented by including the sound hip also in the bandage, so that the patient cannot move the part at all and is unable to raise himself up, if the bandage reaches up to the crest of the ilium, as it should do. If in florid coxitis the flexion and adduction cannot be corrected by gentle pressure, and traction with the hand under an anæsthetic, it is a sign that ligamentous shortening has already taken place. In such cases it is unadvisable to employ much force; some of the fascia lata, or the adductor muscle may be divided subcutaneously and the deformity thus controlled to some extent, but the contracted ligaments cannot be divided. If much force be employed the articular ends may be forcibly separated and the condition of the part made much worse. In this class of cases permanent extension with weights of from one to three pounds, according to the age of the child, answers best. Not unfrequently the most surprising improvement will take place in the extension of the limb in a very short time—perhaps within a week. Extension can then be kept up, or if it be thought better a plaster bandage applied. I abstain always from opening any abscesses that form unless I intend to proceed at once to excision; otherwise, I let them alone until they either become absorbed, as I have often seen happen, or break spontaneously.

I usually only employ the mildest external remedies, such as unguentum argent. nitric. or diluted tinct. of iodine. In early hip-joint disease in very fat children, I have at times made issues just behind the trochanter and kept them open for four weeks or so. Striking improvement sometimes takes place in the condition of the hip under this treatment. The actual cautery—the panacea of the older surgeons for hip-joint disease since the time of Hippocrates—I have never employed, and have seen trouble follow where it was used by others. While at Zürich I excised the hip-joint in six cases, and in four removed part of the acetabulum at the same time. In two of the patients the operation was directly fatal from pyæmia; three died of phthisis some time after excision, one of whom had sufficiently recovered to get about well with the aid of a stick. One case only was alive and well eight years after the operation. As a rule, I am not an enthusiastic supporter of excision of the hip-joint

for caries. I have had no opportunity myself, of seeing good permanent results in the patients on whom I operated myself, or in those who have been under the treatment of others. Again, it must be acknowledged of excision, that it is very seldom capable of accomplishing what an operation for caries ought to accomplish, *i.e.* the removal of all the diseased bone. Removal of the acetabulum has its limits. I do not see that we are justified in performing excision early in children with hip disease, for by timely treatment many more recoveries must follow, and a straight ankylosed hip is better for the patient than an excised joint. Even as regards the functions of the part excision can effect but little, and the power of walking will always be defective. Moreover, the results of excision of the hip are not remarkably favourable *quoad vitam*, and as it does not hold out any great prospect of saving patients from death when they are much reduced, the operation appears, on the whole, to me, to have no great future before it. A minute statistical inquiry as to the course of hip-joint disease, where excision is not practised, and the efficiency of the ordinary remedies in curing it will alone be able to prove decisively the value or worthlessness of the operation. I do not pretend to give any positive opinion on the subject, although I have long and earnestly interested myself in this question.

Chronic inflammation of the hip-joint. Forcible extension.

A child, æt. 12, came under my care, who five years previously had fallen and struck his left knee. Swelling of the part immediately followed, and there was so much pain at the outset that the patient for six months was kept on his back. Gradually disease of the left hip-joint developed, and abscesses formed. The child was sometimes kept at rest, sometimes allowed to get about with crutches; during the summer he was sent to different baths, and was altogether well looked after. To this circumstance may be attributed the fact that his general condition was good when he was admitted. The left leg was then strongly adducted at the hip-joint, flexed, and rotated inwards. He could not completely extend the limb at the knee-joint. On both sides of the limb over the hip-joint were sinuses, from which a moderate amount of discharge escaped. The probe passed deeply into these openings, but no bone could be felt. Treatment was commenced by straightening the knee-joint, which was effected without difficulty under chloroform; a plaster bandage was then applied. A few weeks later I broke down the ankylosis of the hip, and by applying extension materially improved the position. Unfortunately the weight and pulley had soon to be given up, for the

breaking down of the ankylosis was followed by a marked increase in the amount of suppuration; unluckily, too, an attack of erysipelas further reduced the patient. Œdema about the ankle was observed and the urine was found to contain albumin which was not present when he was admitted, but I cannot be sure whether it was the result of the increased suppuration, or a sequel of the erysipelas. On my advice the patient was sent away home, as there seemed to be but little prospect of doing him any good—a result which was to me rather unexpected, for the child, on admission, seemed fat and strong.

This case has convinced me that it is inadvisable to attempt rapid extension of an ankylosed hip-joint in cases where, although the articular surfaces may be healed, there is still suppuration of the soft part. Former experience has brought me reluctantly to the conclusion that straightening of the limb ought not to be attempted in such cases. The subsequent extension by means of weights can only achieve a perfect result, when the rigid cicatricial adhesions between the articulating surfaces have been separated. Still, I am always in hopes that something more than this may be gained by treatment. In ankylosis of the hip, when the thigh is flexed at a very acute angle, and sinuses exist in connection with the soft parts, excision of the head of the ankylosed femur can have but the effect of an osteotomy, and when we consider that contractions of the fasciæ, muscles, and cicatrices about the joint, have existed perhaps for years, the beneficial effects of excision must be doubtful, and the operation may do harm. In the knee-joint the conditions are more favourable, for the malposition of this joint is almost always in one direction, viz. that of flexion, and the slight inflammatory reaction that may possibly follow the breaking down of an ankylosis where sinuses exist is far less dangerous a proceeding and much more easily controlled, than it is in the hip-joint.

Tumour Albus of the Hip-joint.

In tabulating my cases of this disease I met with two considerable difficulties. In the first place, disease of the hip-joint in many cases runs such a chronic course, that it was often difficult to say whether the active disease had ceased, and the case ought to be inserted under the head "ankylosis," or whether the morbid action was still going on. Secondly, there is a form of synovitis which frequently attacks the hip-joint in apparently healthy people between

twenty and twenty-five years of age, and runs its course without suppuration, but frequently entails stiffness and ankylosis. In the clinic such cases were commonly recorded as "rheumatic coxitis." The bones seldom become affected, but the protracted inactivity of the joint, leads to the so-called "cartilaginous ankylosis," in which adhesions form between the folds of synovial membrane, and the capsule of the joint becomes contracted.[1] Such cases, of course, in no way resemble the form of hip-joint disease occurring in children who suffer from dyscrasia. In Zürich I met with this form of rheumatic coxitis, as it is called, in young adults, far more frequently than in Vienna.

I find, from my statistics, that of 82 cases in which suppuration took place, 46 died; while in 60 cases where there was no suppuration, only 7 died. We may perhaps be justified in deducing from this, that the formation of abscess raises the percentage of mortality in hip-joint disease from 11 to 56. Now, this result appears to me to be of importance for it shows that we are scarcely justified in performing excision of the hip, unless suppuration exists, or caries as evidenced by crepitus. To this rule I have hitherto rigidly adhered. An extended series of figures will be required to prove that the ultimate results after excision, are better, as regards function, than those of cases not submitted to operation. Till this is proved, early excision cannot be recommended as the ordinary method of treatment. So far as I know Rose and Volkmann have practised excision very early in hip-joint disease, and the results of their operations at the end of a few years, *quoad vitam* and *quoad functionem* may possibly yield us conclusive evidence on the question.

Subcutaneous osteotomy for hip-joint ankylosis. Death from suppuration.

A child, æt. 8, came under my care with its right thigh flexed at a right angle, the result of old suppurative coxitis. I endeavoured, unsuccessfully, to straighten the limb, but the femur was perfectly immovable, nor could the position be improved after dividing the fascia and muscles. Urged by

[1] Similar changes not infrequently take place in the shoulder-joint after dislocation, but they mostly occur in old people, and are characterised by rapid wasting of the muscles—a symptom that is not so readily recognised in the hip.

the repeated request of the parents, and prompted by the very favourable results of some osteotomies which I had a short time previously performed, I divided the bone subcutaneously just below the trochanter, after Langenbeck's method. The deformity was successfully corrected, though of course the original length of the limb was not completely restored. Extension by weights was employed after the osteotomy. Two weeks after the operation, extensive suppuration set in, all the old cicatrices gave way, suppuration took place about the ankylosed parts, and finally I had to remove the head of the bone and the trochanter, which had become necrosed from suppuration. The patient died of marasmus nine weeks later.

Contraction after chronic hip-joint disease, treated by fracturing the neck of the femur.

Emanuel Z—, æt. 13. In this case the right lower extremity was flexed at a right angle, and somewhat wasted, and the hip-joint slightly abducted. Under an anæsthetic, by means of forcible extension and abduction, the neck of the femur was fractured with an audible crack. A slight rent was made through the skin, at the fold of the groin. The patient was discharged six weeks later, with a straight limb, and but slight shortening. No mobility in the hip-joint.

Franz W—, æt. 12. The hip was flexed at an angle of 35° and strongly abducted. The same treatment was adopted, and the limb brought down perfectly straight. Extension was applied, and after ten weeks the patient was able to walk perfectly well. The joint was ankylosed, but he had slight power of abduction. I heard three years later that this patient was able to walk perfectly well and was anxious to marry.

Marie L—, æt. 30, had coxitis of four year's standing; an abscess had formed over the trochanter, but had closed up six months previously. The right femur was flexed at an obtuse angle, and strongly abducted. In attempting to correct the abduction under an anæsthetic, the femur was fractured; a plaster bandage was applied and the patient was discharged four months later, with about two inches shortening of the limb. I saw her two years after, and she was then able to walk well with the aid of a stick and a high heel. The hip-joint was ankylosed.

In the two following cases I performed osteotomy of the neck of the femur; both patients died.

M. B—, æt. 21, had been ill for three years, from what appeared to have been general subacute osteomyelitis of the left femur and tibia; the knee and the hip-joint both became fixed in consequence. On admission, the knee-joint was flexed at about an angle of 100°. The limb was wasted and strongly rotated outwards and the tibia considerably thickened. An attempt was made

to break down the ankylosis, but without success; thereupon, I performed subcutaneous osteotomy with the chisel through the trochanter and neck of the femur. The limb was put up in a plaster bandage, and open treatment adopted. Owing to the deformity of the knee, very great difficulty was experienced in arranging the bandages and keeping the limb in good position. Profuse suppuration ensued, bed-sores formed, the urine became albuminous, and the patient died of exhaustion.[1]

Constantine W—, æt. 18. For six years the patient had suffered from chronic inflammation of the right hip- and elbow-joints, together with ostitis of the right humerus and left ulna. Twelve months before admission, all the active symptoms had subsided. When admitted he was fairly nourished and seemed well in health; the right hip-joint was ankylosed at an angle of 90°, and strongly abducted. I attempted to break down the ankylosis, without success, and then divided the bone subcutaneously with the chisel just below the trochanter. Lister's dressings were applied. An hour after the patient recovered from the anæsthetic he became cyanosed and had an epileptiform fit, which was followed by others at short intervals during the succeeding two or three hours, and he died of pyæmia a week later.

Dislocation of the femur after typhus.

This condition was noticed in a child, æt. 10. The femur was displaced on to the ilium and could not be reduced, though the limb was moved in all kinds of directions; during the manipulation I felt a fine kind of crepitus, as if the bone were bending. I therefore abstained from further proceedings. The typhus had originated twelve weeks before the patient came up to the hospital. I examined this case repeatedly, and satisfied myself beyond a doubt that dislocation really existed. It is possible, however, that the epiphysis of the head of the femur was only softened and partially detached, so that the greater part of the neck of the femur remained attached to the shaft. Considerable pain was experienced if deep pressure were exerted over the femur. Gradually an abscess formed on the anterior surface of the thigh which broke, and soon closed up again. The patient eventually was able to walk fairly well, though with a slight limp.

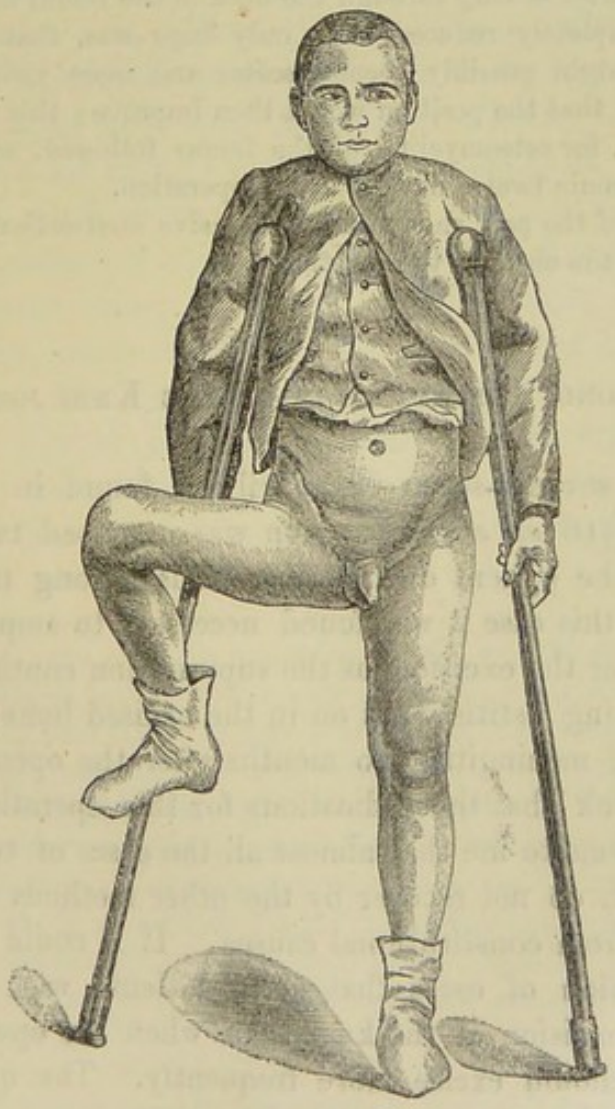
With regard to the origin of the condition I can give no explanation. Unfortunately, no satisfactory history of the case could be obtained. Probably, when admitted into the hospital some osteomyelitis was going on in the upper part of the bone.

[1] This case has been minutely described by Gussenbauer in the 'Archiv für Klin. Chirurg.,' Bd. xviii, p. 404.

Pathological luxation of the hip into the foramen ovale.

The case was that of a boy, æt. 8, in whom from no known cause severe pain had commenced some months previously in the right hip-joint. He was kept at rest, and various local applications were made; abscess gradually formed, and broke in the groin. The thigh was much flexed, abducted, and outwardly rotated at this period of the disease. Gradually the abscess healed up, and all pain in the part ceased, but the position of the thigh remained unaltered. On careful examination, there seemed to be no doubt that the head of the femur was displaced downwards and inwards, just above the lower rim of the foramen ovale (see Fig. 22). There was a fair amount of movement.

FIG. 22.—PATHOLOGICAL LUXATION OF THE FEMUR.



I came to the conclusion that the case was one of those rare instances where the capsule had become perforated after acute

suppuration, and true dislocation had taken place though no caries existed.

In order to facilitate extension by means of weights, I divided some tense bands of the fascia lata subcutaneously. Unluckily this was followed by rather tedious suppuration, and when the wound had healed up, an eight-pound weight had no effect, although good counter-extension was kept up on the pelvis. The patient was then placed thoroughly under the influence of chloroform, and I tried to effect reduction by divers manipulations; however, my efforts met with no success; no improvement followed the use of Schneider-Mennel's apparatus. The head of the bone appeared the chief obstacle to reduction, and I therefore excised it, by an incision made in the perineum; I found no difficulty in the operation. The cartilaginous covering of the bone was almost entire, and over the head of the femur was a distinct capsule. Even after sawing through the neck of the femur the displacement could not be completely reduced. My only hope was, that the cicatricial tissues around might possibly become softer and more yielding from the suppuration, and that the position would then improve; this hope, however, was not fulfilled, for osteomyelitis of the femur followed, and the patient died of septo-pyæmia twelve days after the operation.

Examination of the part showed that extensive contraction of the fascia lata had formed the obstacle to reduction.

Chronic Inflammation of the Knee-joint.

A table of seventy-seven cases will be found in the 'Zürich. Bericht,' pp. 516 *et. seq.* Excision was practised twice only; in one of these the patient died of marasmus a long time after the operation; in this case it was found necessary to amputate the leg, six months after the excision, as the suppuration continued, and the fungous softening ostitis went on in the excised bone. The other patient died of meningitis two months after the operation. I am inclined to think that the indications for this operation should be limited; it seems to me that almost all the cases of tumor albus of the knee which do not recover by the other methods of treatment, are incurable from constitutional causes. If it could be proved by a large collection of cases that more patients with tumor albus recover after excision of the knee than when the operation is not performed, I should excise more frequently. The question is an exceedingly hard one to answer, and it appears to me that on this subject we are still on the threshold of inquiry.

Ankylosis of the Knee-joint.

In many cases where the limb was ankylosed at a bad angle, I employed forcible extension under an anæsthetic. Sixteen cases thus treated at Zürich recovered without any unfavourable symptoms whatever, and the patients were able afterwards to walk with a straight limb. My custom is to abstain from passive movements after straightening the limb in cases where the condition is due to disease which has existed for more than a year, or where suppuration of the joint has followed after injury. It was found necessary in many cases to repeat the process several times before the limb could be straightened, and I did not always succeed in obtaining a perfectly good result. From three to five months, or even more, often elapse before the joint is healed in its new position. The bandages must be kept on as long as there is any pain, but as soon as the patients are able to walk without discomfort, I allow them to get about as much as they please. On the question whether some amount of movement may gradually return after the extension, a reserved opinion must be given. In rheumatic disease affecting only one joint, better results may be expected than in the destructive tumor albus. We must not expect to regain any movement when the leg is rotated outwardly, adducted and flexed, and united obliquely by adhesions to the condyles of the femur. Ankylosis, the result of traumatic suppuration of the joint, is the firmest of all, being usually completely osseous.

Johann M—, æt. 22. Six years previously he had suffered very acute pain in both knees, but the joints were not much swollen, nor was the skin reddened. The pain lasted for five months; he then was able to get about with the aid of crutches and a stick, but in the course of a few months, both knees became ankylosed, the right in an extended, the left in a flexed position. Attempts were made to extend the left leg by means of an apparatus, but without success. The patient then spent some summers at Teplitz, but the mobility of his knee-joints did not materially improve. When admitted I found him a strong man, and in good general health. The left knee was ankylosed at an angle of 120°, and the right completely ankylosed in a straight position.

Although the disease in the joints had ceased five years previously, yet taking into consideration the relatively short duration of the disease and its undoubtedly rheumatic origin, I thought it would

be possible to restore some slight degree of mobility by breaking down the ankylosis. It appeared to me, that the ankylosis was essentially due to adhesions of the synovial folds.

Accordingly the patient was placed under chloroform, and I thoroughly broke down the ankylosis on both sides. The right leg, previously straight, I was able to flex to a right angle, while the left limb could be brought perfectly straight; the left leg was then put up in plaster, and the right in a splint, and ice applied. All pain soon subsided, and after ten days I commenced gentle passive movements in the right knee. At first the pain was very severe, but it became less every day. Fourteen days after the extension, I removed the plaster bandage, and commenced passive movements on the left leg. Four weeks after the operation, slight active movement commenced; I then sent the patient to Ragatz. A few months later I saw him again; he could then walk without the aid of a stick, could extend the knees completely and flex them nearly to a right angle. When the patient left the hospital the first time, loud friction sounds could be heard in the joint, but when he made his second visit, these had almost entirely disappeared.

Success like this can only be attained when little or no alteration has taken place in the cartilages. The case strikingly illustrates the brilliant results obtainable by forcible extension under an anæsthetic. Had it not been for this treatment, the knees, most undoubtedly, would have continued stiff.

Ankylosis of the knee; forcible extension; gangrene of the leg.

F. A—, æt. 29, a weakly, anæmic woman, was admitted with the knee-joint flexed at so acute an angle that the heel was almost in contact with the nates; the leg was rotated inwards, and the patella displaced somewhat outwards; the condition was probably due to metastatic inflammation of the joint of puerperal origin. Under an anæsthetic, the limb was forcibly extended. The thin skin over the popliteal space was lacerated during the extension and left a gap three inches wide. No further attempt at extension was made, and the limb still flexed at an acute angle, was put up in plaster; the foot was cold and devoid of sensation. On the following day the plaster bandage was removed; the patient had much pain in the leg, and gradually well marked gangrene became evident. The thigh was amputated, and the patient died. On examining the amputated limb, both the popliteal artery and vein were found to be lacerated.

Cicatricial contraction of the knee-joint.

L. R—, æt. 21, had suffered from syphilis eight years previously. He had ulceration about the back, the upper arm, and the forehead. Under

iodide of potassium the sores healed up in nine months, and the patient's health remained good for six years; fresh gummata then formed in the right popliteal space, and elsewhere, which broke after a time and led to deep ulceration and extensive destruction of the integuments. Further breaking down was at length arrested, but as the part healed up, the knee became contracted to a right angle, beyond which it could not be extended, though it admitted of some flexion. Paralysis of the peroneal nerve was also evident. On more minute examination, it was found that the cicatrix was very tough, and connected to the capsule of the joint and the deep vessels and nerves. I tried to flex the leg under an anæsthetic, but without success. Seeing that incision into the cicatrix and the popliteal space would have been not only dangerous but useless, I made incisions through the skin, just above the cicatrix, and also on the posterior surface of the thigh. By extending the incision, I cut right round the cicatrix from above, and dissected up the skin and partly also the fascia. I was then able to extend the leg to an obtuse angle. Extension was effected by means of a weight; the cicatrix softened and yielded gradually, so that within three weeks the leg was straight. The man was supplied with a light splint to keep the limb in good position. After a short time he was able to walk well, without the aid of a stick.

Ankylosis of the knee-joint; osteotomy.

W. K—, when three years of age, had swelling of both knee-joints with contraction, after an attack of measles. Abscesses, which seemed, however, only to be situated in the subcutaneous cellular tissue, formed above both knees. The pain in the joints gradually disappeared, but the contraction of the limbs persisted. The patient hopped about on his hands and legs like a frog. When admitted, both knees were flexed at an acute angle but by passive movement could be extended to a right angle. Both tibiæ were displaced backwards to some extent, and the knee-joints covered by deep ulcerations. The child was ill-nourished and pale, and the case was not very promising for treatment. Still, as the parents of the child were very anxious that he should be treated in hospital, I first tried to cure the scrofulous ulceration about the joints by means of various remedies, and at the end of five months, I had so far succeeded that I was able to think of attempting to straighten the legs under chloroform. I was unable, however, to completely straighten either of the limbs. When extended a little beyond a right angle, the contracted posterior ligament and the tension on the scarcely healed cicatrices were the principal obstacles. In addition the flexor muscles were shortened, and I felt that neither *brisement forcé*, nor gradual mechanical extension could be of any use.

The question now arose as to whether extension of the limb could be effected by any other means. Two operations suggested themselves; one, to resect so much of the condyle of the femur as would permit the long axis of the tibia to drop into a line with that

of the femur, and the other to cut out a wedge-shaped piece out of the femur, close above the lower epiphysis (resection or osteotomy of Rhea Barton). Eventually I selected the latter operation, for by the other method the mobility which existed would have been sacrificed, and again, by the injury that probably would have been inflicted upon the lower epiphysis, the leg would have become very much shortened; by means of Rhea Barton's operation the epiphysis could be preserved. I proceeded to perform the following operation on the left thigh.

I cut down on the femur, a little above the spot where the upper border of the large bursa connected with the knee-joint lies beneath the quadriceps. The periosteum was then divided, and detached from the posterior surface of the bone. I then passed the chain saw beneath the bone and sawed obliquely through it upwards and forwards. As soon as I had cut through the femur, I was able immediately to straighten the leg. It seemed to me quite unnecessary, therefore, to saw off a corresponding piece from the lower end, but still I did so in order to carry out the operation as advised. The limb was now placed in a plaster bandage in a position of complete extension. The reaction that followed was remarkably slight, and the operation wound had completely closed up within six weeks. Two months after it had healed, I performed a similar osteotomy on the right thigh, but on this occasion I did not remove any portion of bone, and merely divided the femur obliquely; although at the time of operation this was sufficient to allow the limb to be completely straightened, yet later on we found that the result was not so good as in the other leg. In three months the patient was able to get about the ward, supporting himself by the beds and walls, or with the help of crutches. Both femora were firmly united and almost straight.

Some eight months later I heard again of the boy, and from a plaster cast which was sent me, saw that the knees had again become somewhat bowed. The right knee could be extended to an angle of 163° and flexed to 100°—the left from 144° to 90.° The boy was able to walk fairly well without using stick or crutches, though his gait was awkward. The feet spread outwards, and the upper part of the body craned forwards.

On the whole the success of the operations, especially as regards the slight reaction which followed on both occasions, exceeded my most sanguine expectations.

Andreas R—, æt. 38, a strong, well nourished man, suffered from chronic inflammation of the left knee-joint when he was sixteen years of age. According to the description of the patient, the disease seemed to have com-

menced as periostitis on the posterior surface of the lower end of the femur. Small portions of bone came away from time to time, and the sinuses closed up ultimately after six years. The result was that the knee was somewhat stiff, but his walking was not interfered with. The year before his admission he was attacked with acute inflammation of the same knee-joint, which ran on to suppuration, and terminated in ankylosis. When admitted, the left leg was completely ankylosed at a right angle. As extension under an anæsthetic did not succeed, I removed a wedge-shaped piece from the condyle, and was then able to put the leg perfectly straight. The limb was put up in a plaster splint. Spasmodic movements of the leg were very troublesome for about a fortnight, but yielded to opium and morphia injections. The febrile reaction was remarkably slight.

Six months later the following report was sent to me:—"The sinuses completely closed three months after the operation; the patient will soon be able to get about without any support; the knee-joint can be flexed through about 10°; the shortening amounts to about two inches."

Tumor Albus of the Knee.

Tables showing the age at which, in 231 patients, this disease commenced, will be found in the 'Wiener Bericht,' 1876, p. 559. Ninety-eight cases commenced between the ages of one and ten, and three are recorded as occurring between the ages of sixty-one and seventy-one.[1]

I find that the percentage of mortality rises from 6 to 57 per cent. if suppuration occurs. On the whole, suppuration is rather less dangerous in the knee- than in the hip-joint; the prospect of recovery in disease of the knee is slightly greater than in hip-joint disease.

The following case of excision, where the operation was followed by acute meningitis, deserves notice.

George W—, æt. 5, had suffered from swelling and pain in the left knee for nine months; the disease was of traumatic origin. Under an anæsthetic, the knee-joint was extended, and a plaster bandage applied. This

[1] Probably under the category of tumor albus is included more than one affection of the joint, and not solely the disease now commonly known in England as "pulpy degeneration." [Ed.]

had to be removed a few days later, owing to great pain in the part, and the formation of a periarticular abscess. In spite of keeping the joint at perfect rest, the application of ice, etc., he grew worse, and I eventually excised the knee. Two days after the operation, the patient died of acute meningitis and œdema of the brain.[1]

Hydrops Genu.

In one case of this nature I tapped the joint and injected a mixture containing equal parts of iodine and water; after five minutes the injection was allowed to escape again. Recovery followed, though I was unable to learn whether it was permanent. Puncture and forcible pressure by bandages effected a cure in one case. Lately I have adopted Volkmann's plan of forcible compression, and Heine's method of compression with sponges. The fluid was usually absorbed, but the treatment gave great pain and the fluid re-collected, directly the pressure was relaxed. Many cases proved very obstinate, while on the other hand, many subsided with simple rest. I know no method of treatment which is at once quick in its action and efficacious in preventing recurrence in this troublesome complaint.

Loose cartilage in the knee-joint.

A man, æt. 29, was admitted, who had suffered for ten years from characteristic symptoms of loose cartilage in the knee-joint. The patient was able to press the loose body towards the patella, and there fix it. In this situation I cut down and removed a body, the size of a plum stone, composed of bone, with a cartilaginous investment. The parts healed up by first intention, without any antiseptic precautions. It was now discovered that a second small loose cartilage was still in the joint, which was not so easily brought to the surface. I cut down upon it as before, a month after the first operation. Unfortunately, a good deal of blood escaped into the joint, suppuration of the knee followed, and the patient died of pyæmia.

Rosalie H—, æt. 46. In this case the characteristic pain had first drawn her attention to the loose cartilage two months before admission. Swelling of the knee and rigors followed, with subacute synovitis lasting for three months. The patient had been able to distinctly feel the cartilage before

[1] Further details of this case will be found in the 'Wien. Med. Woch.,' 1869, No. 1. Cf. also 'Wien. Med. Woch.,' 1868, No. 1, and *supra*, Chapter II, p. 12.

admission, but was unable to do so during the fourteen days she remained in hospital; she was then discharged with a knee-cap. I heard a year later that the knee was perfectly well, and she had had no fresh pain in the part. The diagnosis in this case was somewhat doubtful.

A man, æt. 23, was admitted, who three months previously had fallen down in the street on his right knee. Acute synovitis followed, and he was confined to bed for a fortnight. He then resumed his occupation as a tailor. Shortly afterwards, he felt one day, while walking, a sudden stabbing pain in the knee, and was forced to sit down. Placing his hand on his knee, he felt beneath the skin on the inner side of the patella, an elongated, round, elastic body, which he was able to push about from one part to another, but which slipped away from under the fingers. On the second or third day the same thing happened again, and caused the man to come up to the hospital. The patient would not submit to any operation, and was discharged again after a while. I saw him again two years later. The loose cartilage gave him no particular trouble; it made its appearance perhaps two or three times in the course of a year, but went away again at once. At times he had some swelling of the knee-joint (a slight degree of hydrops genu). Crackling could be felt when the joint was moved (arthritis deformans).

Chronic Inflammation of the Ankle. (Z. B).

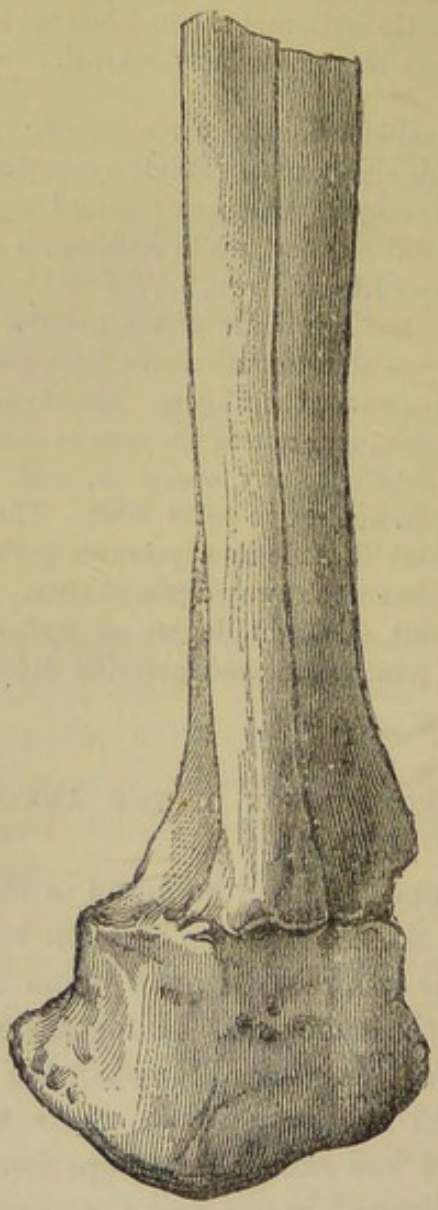
A table of thirty-nine cases will be found in the 'Zürich. Bericht,' pp. 532 *et seq.* In six cases partial excision was performed; thus in four the astragalus was removed, and in one the lower end of the tibia was excised at the same time. Pirogoff's amputation was performed in nine cases; recovery followed in the successful cases, at periods varying from seven and nine weeks up to four months. Those who recovered had excellent stumps (see Fig. 23). Syme's amputation was performed in one case; recovery followed in fifty-one days.

Chronic Disease of the Bones and Articulations of the Foot. (Z. B).[1]

The first metatarsal bone is comparatively frequently diseased. Recovery in many cases is very tedious after its excision, and the regeneration of bone after superiosteal removal is either very small or entirely wanting. I make it my practice, therefore, among the

[1] Tables of thirty-six cases will be found in the 'Zür. Ber.,' pp. 542 *et seq.*, and 546 *et seq.*

FIG. 23.—BONES OF STUMP FOUR AND A HALF YEARS AFTER PIROGOFF'S AMPUTATION.



working classes, to remove the hallux, together with the metatarsal bone, when operation is found necessary. The parts usually heal rapidly, and the gait is not appreciably interfered with. It has also been urged against the practice of removing the first metatarsal bone and leaving the great toe, that the latter becomes displaced by the contraction of the cicatrix, and that its presence is rather detrimental than otherwise when the patient begins to wear a boot. It may be so, but one of my cases showed that such is not always the case.

Disease of the Tarsus.

A point of interest that occurred to me in studying my tables of this disease, lay in the fact that the os calcis was, in numerous instances, alone affected; among fifty-three cases of diseased tarsus, the calcaneus alone was affected in twelve, and in every instance suppuration occurred. In all my cases, I practised *évidement* with subsequent removal of the sequestrum. One of my patients died of pyæmia; unfortunately, in many of the cases I was unable to learn how far the treatment was ultimately successful. I regret this, for it would be important to know whether, in such cases, the operation of *évidement* is a judicious one; at the best, a long time elapses before the cavity becomes filled with bone; the walls are so rigid owing to the formation of osteophytes (invaginating bone) that they cannot contract. I trust that others will be able to give us further evidence on this point.

In the 'Wiener Bericht,' for 1876, p. 572, will be found parallel tables, showing the relative frequency of bone and joint affections in the upper and lower extremities. One point my tables seem to make out tolerably clearly is that in individuals of scrofulous and tubercular habit the upper extremity is, after the lungs, the part most commonly affected. When the two conditions are combined the prognosis is decidedly unfavourable.

Section D.—Tumours, Aneurisms, Deformities, etc.—*Cases of lipoma; enchondroma; ecchondrosis ossificans bursata; multiple osteomata; neuro-fibroma; recurrent ditto; cavernous lymphatic tumour (2); melanoma; pulsating sarcoma; central sarcoma of femur—removal; epithelioma.*

Cases of femoral aneurism treated by ligature; ditto compression and ligature; traumatic aneurism—Antyllus' operation; ditto cured by compression; spontaneous aneurism—double ligature of femoral; traumatic aneurism; arterio-venous aneurism; femoral aneurism treated by arterial clamp; popliteal aneurism treated by ergotine injection. General remarks on treatment of aneurism. Genu valgum; osteotomy. Case of spastic talipes. Remarks on talipes; treatment; case.

Osteotomy for ricketty deformities. Case of congenital dislocation of toe. Case of pes gigas. Case of congenital absence of femur.

Fatty tumour of the thigh.

A man, æt. 55, came under my care with a tumour the size of his head, at the back of the thigh. On removal it proved to be situated beneath the fascia. The growth had existed for four years, and had increased slowly, without giving any pain. I suspected from the symptoms that it was a case of myxo-sarcoma. An almost exactly similar case was met with in a woman æt. 46. The fact that the growth had existed for only one year, led me to the conclusion that it was a sarcoma, for I could scarcely believe that a fatty tumour could reach the size of a man's head in twelve months only. The tumour was removed, but the patient died of septicæmia.

Enchondroma in the sheath of a tendon. Result of Chopart's amputation.

Herr X—, æt. 35, a stout, strongly built man, had suffered for many years from a slowly growing, moderately firm tumour, which was situated over the second tarsal bone. Over the upper part of the swelling was an opening from which ill-smelling, purulent secretion escaped. I removed the tumour, together with the toe, leaving the base of the metatarsal bone. Unhealthy suppuration and septic fever followed the operation. The anterior part of the foot became involved, and I therefore performed Chopart's amputation. Anatomical examination of the tumour showed that it was composed of cartilage, and was situated in the sheath of the long extensor tendon of the second toe; in the centre of the mass was a cavity the size of a walnut, full of ichorous fluid; a piece of necrosed bone (a partly ossified portion of the chondroma) lay in the cavity.

I saw this patient two years later. The foot was then in good position, without any tendency to equinus, but still the patient only used his foot as if he had a wooden leg, and did not utilise the mobility of the ankle-joint. The stump was often painful and in a constant state of perspiration. I was not particularly pleased with the power of walking on this stump, and am of opinion that it is no better than that obtained by Pirogoff's operation.

Ecchondrosis ossificans bursata on the lower end of the femur.

B—, æt. 27, had fallen nine years previously on his right thigh; since that time he had often felt slight pain in the part, though he never walked lame.

About a year after the fall he discovered a growth about the size of a hazel nut on the painful spot, close above and on the outer side of the knee-joint. The tumour grew slowly but constantly, and gave no pain. The patient was a perfectly healthy, athletic man. Just above the right knee-joint could be felt a nodulated, bony hard tumour, covered over by a soft, almost fluctuating mass; the entire new formation was the size of a fœtal head. It interfered somewhat with the movements of the knee-joint, but did not occasion any great discomfort. The patient had consulted Balassa, and also Schuh, who had wisely dissuaded him from operation. I took the growth to be an exostosis of the epiphysal cartilage, over which a bursa had formed secondarily. The bursa did not seem to communicate with the joint, as the fluid could not be pressed from one cavity to the other. I acceded to the patient's earnest request and removed the tumour, extirpating the bursa and sawing through the exostosis; the latter was invested with cartilage, and had a broad base of attachment.

Professor Rindfleisch, who took a great interest in the case, had no doubt that the bursa over the tumour of the bone was a process of the synovial membrane of the joint. During the operation I was unable to trace any connection between the sac and the bursa beneath the joint. Unfortunately the result was calamitous, as the patient died in five days of septicæmia. We were unable to obtain a post mortem.

Multiple osteomata.

A. D—, æt. 8, had, on both femora, tibiæ, and one of the bones of each forearm, numerous fixed tumours of the size of a hazel nut, and of bony hardness. No impairment of function.

Neuro-fibroma of the sciatic nerve.

Leopold S—, æt. 32. Thirteen years previously he had received a kick in the left gluteal region, which gave him such intense pain that he fell to the ground. After a few days the pain became less severe, but some tenderness persisted. Two years and a half before admission the pain again became worse, and extended down to the left leg as far as the toes. For twelve months the patient had noticed a deeply situated hard tumour, near the tuberosity of the left ischium; pressure on the growth caused intense pain down the leg. The tumour had been increasing rapidly up till the time of admission, and was then the size of a large fœtal head. The soft parts over it were stretched, and severe pain was experienced on pressure over any part of the leg. For a long time he had been confined to his bed, lying usually with the knee flexed. I found considerable difficulty in dissecting out the tumour. The nerve bundles were pressed out and flattened into strips;

fortunately I was able to dissect them away from the growth, so that there was no loss of function after the operation. For the first few weeks he had intense pain in the part, nor did this entirely disappear until the nerve was completely covered in by granulations. When discharged there was no trace of recurrence; he could walk fairly well, and had but little pain in the cicatrix. He died, three months after leaving the hospital, of dropsy and marasmus.

A point of remarkable interest in this case is that, although the bundles of nerves, after they had been separated by the finger from the tumour, lay perfectly free, like telegraph wires, across the wound, still their conducting power was perfect. In extirpating large masses of glands from the axilla I have observed the same thing.

Neuro-fibroma; repeated recurrence.

M. W—, a tailoress, æt. 25, came under my care for a tumour, the size of a walnut, situated in the calf of the leg. The growth was exceedingly painful, the slightest touch being sufficient to cause intolerable suffering; the pain also frequently occurred spontaneously. Subcutaneous injections alone gave her temporary relief. I removed the tumour, together with a portion of the N. suralis magnus which enveloped it. The growth recurred in connection with the ends of the cut nerve and was removed on four separate occasions, on the last of which I was only able with great difficulty to avoid opening the knee-joint. The growth again recurred; it became united to the cicatrices of the former operations and to the skin, the parts ulcerated, and the pain was so severe that the thigh was amputated through the lower third. She recovered from this, and a year later there had been no recurrence of the pain.

I repeatedly examined the growth fresh, as well as the specimens prepared in spirit; it appeared to me to be a simple fibroma, which probably had originated in the neurilemma of the sural nerve, and recurred in connection with the nerve stumps and the surrounding cellular tissue. I have nowhere found any drawings which would justify us histologically in considering these tumours as true neuromata, with perhaps the new formation of non-medullated fibres, in the sense in which Virchow has extended the signification of neuroma. I cannot ignore the fact that in similar tumours I have been unable to make such a positive distinction between bundles of non-medullated nerve fibres and bundles of fine connective-tissue fibres, that I was thereby enabled to diagnose an "amyelinic neuroma."

Cavernous lymphatic tumour.[1]

A girl, æt. 19, whose previous health had been good, was seized suddenly with pain in the left groin; she had also vomitings and slight rigors from time to time; these attacks, which were accompanied by an erysipelatous blush starting in the groin, lasted often for eight days or so, and persisted for a few months, at the end of which time they ceased; for four years she had had a discharge of lymph, coming from clear, transparent vesicles on the inner aspect of the thigh. The tumour, which was about the size of a fist, was thought at first to be a chronic abscess with an open sinus, and accordingly an incision was made; the cavernous network of the growth was, however, distinctly recognised and a quantity of lymph escaped. As the wound subsequently assumed a rather unhealthy appearance, and the patient became feverish, the part was cauterised with fuming sulphuric acid. On two occasions pressure was made, after the galvano-cautery had been applied to the tumour, but without any benefit. The discharge of fluid continued as before, and the eysipelatous attacks recurred again. The discharge amounted to about forty grms. in the hour. I then removed the tumour, dissecting it all out except a small process which ran down between the large vessels of the thigh; these vessels were exposed during the operation. For a time after the operation there was a slight discharge of lymph, but this gradually ceased, and in six months the patient left perfectly well.

The tumour consisted of a reticulate stroma enclosing cavernous spaces lined by a beautiful lymph epithelium.

A child, æt. 1½, was brought to me with a soft tumour as large as the fist on the dorsum of the foot, of congenital origin. At the time of birth, it was about the size of a date. After removal it was found to consist of fibrous tissue, enclosing numerous cavernous spaces filled with lymph.

Melanoma (Melanotic Sarcoma?) of the Skin of the Leg.

I scarcely know whether to classify as sarcomata or carcinomata, the tumours, of which the following case is an instance, which occur in the form of small, dark, nodules, and fungus-like growths in the skin of the leg. The form, nature of origin, and mode of onset resemble sarcoma; the anatomical structure, too, of many of them favours this view; but in the larger nodules, growths connected

[1] For a description of this rare form of tumour see 'Billroth's Path.,' Hackley's transl., p. 610; Cf. also Virchow, 'Krank. Geschwülste,' vol. iii, p. 490; Lücke, 'Geschwülste' p. 267; and Dr. Gjorgjevic, in 'Arch. f. Klin. Chirurgie,' Bd. xiii, Heft. 2, p. 646, who described the case of the girl, quoted above, more fully. Compare also a case recorded above, p. 379.

with the rete Malpighii are met with of such typically adenoid form that they seem to be a combination of epithelial cancer and sarcoma. In the case given below there would have been no doubt, had the cells of the invading epithelial growths possessed the ordinary flat shape or that of the cells of the rete Malpighii. This, however, was not the case; some of the epithelial cells were cylindrical, others of irregular shape. I am doubtful, therefore, as to the proper position of these growths, but am inclined to consider them as sarcomata, since the new formation invariably arises in the papillary layer of the cutis.

J. S—, æt. 56. From childhood he had had a wart about the size of a pea on the left leg; the growth was situated on a dark pigmented patch, the size of a farthing. When he was fifty-five years of age, this wart began, from no obvious cause, to grow, and within two months had attained the size of a walnut. Then numerous bluish and dark spots and little nodules developed in the primary tumour. The original growth was removed by means of a ligature, but this had no effect on the progress of the secondary growths. The patient's health was always good, though he was not a remarkably strong man. The integument of the anterior part of the leg was diseased over an extent of the size of a man's hand. The man suffered much pain, and was very anxious for an operation; the inguinal glands were not enlarged. I removed the whole of the diseased integument; the patient left in a few months, before the wound had completely healed. Even then, however, some fresh nodules were visible in the immediate neighbourhood of the cicatrix; their number increased, severe pain occurred in the breast and back, and he died twelve months later. Duration of the disease two years.

Pulsating sarcoma of the tibia.

H. R—, æt. 26, a cobbler. For some months a tumour had been developing at the lower end of the tibia. The bone was considerably widened in appearance. I resected a portion of the tibia, about three inches in length, including the articular cartilage of the ankle. Gangrene of the foot followed, and he died of pyæmia in six weeks. The growth proved to be a vascular, central osteo-sarcoma.

Herr B—, æt. 29. For two years he had noticed a painful swelling of the tibia, especially at the lower part, and had been unable to get about. He had never had syphilis. I found in the medullary cavity of the tibia a diffused growth expanding the cortical substance of the bone to some extent. At the lower part the tibia was enormously expanded, yielding parchment crackling as the thinned plates of bone gave on pressure. At this part too there was distinct pulsation and an aneurismal friction bruit. The leg was amputated just below the knee. Death in six days from septicæmia.

No secondary growth was found at the post-mortem examination. The apices of both lungs were full of tubercle. The tumour proved to be an enormously vascular alveolar sarcoma, studded with numerous extravasations.

Central sarcoma of the femur. Removal.

Katharina F—, æt. 17, came under my care in January, 1870. In February, 1869, she had a fall while dancing, followed by some swelling about the left knee, and had never since been able to walk without crutches; the knees were flexed at an angle of 104°, and admitted of very slight active and passive movement. About four fingers' breadth over the patella and extending down to the joint the thigh was enlarged, its diameter being about 3 centimètres greater than that of the opposite side. On the inner side "parchment crackling" could be felt; in this situation, too, slight pulsation was perceptible, and a bruit resembling the placental murmur could be heard. The tibial pulse was unaltered.

The patient absolutely declined amputation; accordingly I excised the diseased portion of the bone, sawing off about six inches. The medullary cavity was found full of sarcoma. The patient, who was greatly reduced at the time of operation, was much exhausted by the subsequent suppuration, diarrhœa, and bed-sores, and died ultimately of pyæmia two months after the operation. Osteomyelitis of the femur was found post mortem with necrosis of the greater part of the shaft. The iliac veins contained purulent thrombi; the sarcoma was richly studded with myeloplaxes.

Epithelioma of the leg.

Joseph B—, æt. 41. Sixteen years before admission, as the result of a blow, a portion of the integument over the shin, the size of a florin, sloughed, and a scale of bone separated at the seat of injury. The wound healed up, but ever since had been covered with a scab. Two years before admission "proud flesh" began to grow from the ulcer, which bled at times, and gave pain. When admitted the case was one of undoubted epithelioma. The inguinal glands were somewhat enlarged, but not more than on the opposite side. Amputation was advised, but the patient declined it; thereupon I extirpated the growth, scraping it off the tibia with a raspatory. A paste, composed of chloride of zinc and starch, in equal parts, was applied, and led to the separation of a large scale of bone. The part then rapidly healed up, cicatrisation being accelerated by skin grafting. Five years and three months after the operation, I heard of my patient; no recurrence had taken place; he was perfectly well in health. The cicatrix now and again became perhaps excoriated, but always healed up again readily.

Aneurism of the femoral artery.

Caspar W—, æt. 50. Fifteen years previously he had suffered from

remittent fever and some severe illness, which lasted for nine months. He had been at his work as a bricklayer up to four weeks before his admission. At that time, without any known cause, he was attacked with severe pain in the thigh, which at first became markedly swollen, and then cold, as if lifeless. A swelling the size of a child's head appeared about the centre of the right thigh, on the inner aspect of the limb; this was thought to be a spurious aneurism, resulting from the rupture of an artery. Digital compression was employed at first, but without success, as the patient could not stand the pressure. I then ligatured the femoral artery immediately above the aneurism. For two weeks all went on well, but then symptoms of disturbance in the circulation of the leg became manifest, and eventually gangrene set in. The thigh was amputated high up, and recovery followed. The diagnosis was verified by the examination of the limb. "An immense sac, partly gangrenous; femoral artery in part calcified and in it a longitudinal rent five lines in length."

Johann B—, æt. 57. This patient had suffered for two years from vague rheumatic pains. Fourteen days before admission into the hospital he experienced sudden pain in the thigh, and shortly afterwards, a small, hard swelling was noticed in the part. When admitted the swelling was the size of a goose egg, and presented all the characteristics of aneurism. Digital compression was employed, and ice applied; the tumour, however, increased and the patient began to lose strength. I then ligatured the artery close beneath Poupart's ligament. The ligature came away in thirteen days; secondary hæmorrhage took place for which it was found necessary to secure the artery above and below the seat of ligature. Death followed from exhaustion. The post-mortem appearances exactly resembled the case above mentioned.

Traumatic aneurism of the femoral artery. Antyllus's operation.

Franz L—, æt. 19. Six weeks previously he had received a wound in the left thigh from a sharp butcher's knife. Severe bleeding occurred at the time, which ceased only when the patient fainted. He placed himself under the treatment of a barber. The hæmorrhage recurred on three occasions up to the date of admission; the patient was then much reduced and pale, with a small weak pulse; the lower extremity was swollen, especially on the lower and anterior aspect of the thigh, where was situated a tense, highly elastic swelling, soft and "boggy" at several points. In the line of the sartorius was seen a partially united incised wound over the lower half of the thigh. The patient was anæsthetised, and the artery being compressed just under Poupart's ligament, I made an extensive incision through the soft parts, over the sartorius. A coagulum, the size of a child's head, was turned out and the artery exposed at the bottom of the wound. An incised wound, three lines in length, longitudinal in direction, was seen on the vessel. The vessel was ligatured half an inch above and below the wound. In spite of firm pressure some bleeding still took place, which was not finally controlled till

a third ligature had been applied. The wound was dressed with carbolic oil; the same evening the œdema of the extremity had considerably diminished. Slight oozing of dark blood still persisted, which was found to be due to the fact that the vein had been wounded at the same time as the artery. A double ligature was placed around the vessel, and the hæmorrhage stopped; the œdema after this again increased. On the tenth day two ligatures came away; the artery—yellow in colour, and tomentose in appearance—lay free in the wound. On the twelfth day sudden severe hæmorrhage occurred. I ligatured the femoral artery close under Poupart's ligament, and the hæmorrhage ceased, but this last loss of blood was too much for the patient, and he died from gangrene of the foot two days later. No post mortem was permitted.

Aneurism cured by compression.

A man, æt. 23, was wounded in the thigh by a conical bullet owing to the accidental discharge of a revolver which he let fall from his hand. During the first few hours considerable swelling took place, which partly subsided under cold compresses and rest. Twenty-two days later an aneurism was detected by his medical attendant, for which digital compression was applied and employed daily for two or three hours. When admitted, the shot wound, situated at the junction of the lower and middle thirds of the right thigh, was found to be cicatrised over; no aperture of exit existed, nor could the bullet be discovered. Just above the cicatrix was a markedly pulsating aneurism, an inch and a half in length and an inch in breadth; a loud blowing murmur was distinctly audible. The integument was movable over the swelling, and there was no pain on pressure. For the first three days digital compression was employed for seven, nine and ten hours respectively, and then compression by means of a horse-shoe tourniquet and pad. The patient, who was very tractable, applied the compressor himself whenever the pulsation became distinct, and the treatment was continued with but few hours' intermission for twenty-three days. By the ninth day the tumour had become distinctly harder, and the pulsation diminished. On the twenty-eighth day, when the tourniquet was removed no pulsation could be detected, but after eight hours it was faintly perceptible. Compression was resumed and the patient discharged nine days later. The pulsation of the artery could still be felt indistinctly at the situation of the aneurism; it seemed to be separated from the sac. Eighteen months later I heard that the patient was able to do his work, and was in the habit of applying the tourniquet for a day or two when any pulsation could be felt. No further increase of the aneurism followed.

Popliteal aneurism; compression; double ligature of femoral.

Ignatz G—, æt. 36, a labourer. Eight months previously, from no known

cause, he had experienced pain in the calf of the leg; after a few weeks this disappeared. A month before admission the pain recurred, and after a fortnight he noticed a swelling in the right popliteal space, which had not materially increased up to the time of admission. The knee-joint was flexed at an obtuse angle. Situated in the popliteal space was a sharply-defined pulsating tumour, the size of the fist, in which a rasping murmur was audible. The overlying integuments were stretched, but freely movable. The patient in other respects appeared healthy, and there was no rigidity of the arteries. By forcible flexion the pulsation could be diminished, but not entirely controlled. Compression, partly instrumental, partly digital, was employed during seventeen days, but the patient complained so much that the treatment had frequently to be discontinued for several hours. At first the aneurism seemed to become more solid, but eventually we were obliged to give up the compression. I then adopted the plan recommended by von Langenbeck, and injected two grms. of the extract of ergot between the skin and the sac of the aneurism. Slight inflammatory swelling about the seat of puncture was the only result. As the aneurism then commenced to increase rather rapidly and became more diffused, I ligatured the artery in Hunter's canal; the pulsation then ceased, the aneurism diminished in size and became harder, and the œdema of the leg subsided. Twenty-three days after the ligature, hæmorrhage occurred, which was controlled for the time by pressure, but was repeated the next day. Dr. Czerny then tied the artery in Scarpa's triangle and the hæmorrhage ceased. Two days later bleeding again took place from the proximal end of the site of the first ligature, but not so severely as on the first occasion. After an unsuccessful attempt to secure the artery at the seat of hæmorrhage, a tampon soaked in perchloride of iron was applied, and no further bleeding took place. The second ligature came away on the twenty-fourth day. By means of extension with a weight and pulley, the limb was completely straightened. When he was discharged, four months after admission, the aneurism was still soft and pulsated feebly at one point. A year later I heard that he was in good health and able to walk well with a stick and a high heel; all pulsation had disappeared.

Traumatic aneurism.

Franz M—, æt. 42. Three weeks before admission he was wounded accidentally in the right thigh by a sword, which passed from the upper and outer to the lower and inner part. The hæmorrhage soon ceased on the application of a bandage and the wound healed rapidly, but a pulsating tumour developed at the time, and increased in size up to admission. When I saw him there was a flat pulsating tumour at the junction of the middle and lower thirds of the right thigh. Signoroni's compressor was applied, and the patient very soon learnt to manage the instrument well for himself. From time to time, also, the entire extremity was bandaged. After sixteen days the aneurism had distinctly diminished and the pulsation ceased. The compressor was applied during another month, by which time the aneurism

had so contracted that it could scarcely be felt. Four years later the patient came back again. He told us that soon after he went back to his work the aneurism returned, but it gave no trouble and did not increase in size until two years and a half later. In spite of earnest warnings of the ultimate danger, the patient could not be induced to submit to the compression again.

W. L—, a butcher, æt. 34, sixteen years previously had accidentally stabbed himself on the inner side of the left thigh. Blood spurted out of the wound and he fainted; the hæmorrhage was controlled by a tampon saturated with collodion. A year later a distinctly pulsating nodule, which rapidly grew to the size of a hen's egg, developed in the cicatrix. For ten years the aneurism did not increase in size, and occasioned the man scarcely any inconvenience; but seven weeks before admission he was seized with severe pain about the part. When admitted, nearly the whole of the left thigh on the inner and anterior aspect was occupied by a pulsating tumour, over which the skin was discoloured and at several points very much thinned. Esmarch's bandage was applied, and Antyllus's operation performed under antiseptic precautions. Septic symptoms followed and on the third day I was forced to open up the sac, which had been united by sutures. Diphtheritic inflammation of the wound ensued, and secondary hæmorrhage from the distal end of the artery. He died a month after the operation. Post mortem: all the organs were found very anæmic. At the seat of the upper ligature only the conical upper part of the clot was firm, the rest of the thrombus being converted into a cheesy pulp.

Anterio-venous aneurism.

Julie P—, æt. 32. Four years previously she had received a deep stab in the right buttock; severe hæmorrhage followed, arrested by pressure. The outer part of the leg was devoid of sensation. A whirring sound could be heard in the femoral artery close under Poupart's ligament, and for a long time there was extravasation about the thigh. Then on the inner side of the thigh a pulsating tumour formed, in which a distinct whirring bruit could be heard. Blebs had frequently formed on the sole of the foot, and after a time a callous ulcer developed on the heel; the latter trouble induced the patient to come up to the clinic. An arterio-venous aneurism was found in the upper third of the femoral artery. The veins of the limb were not dilated. Compression was applied. Under continuous water baths the ulcer of the heel cicatrised, but the aneurism was not affected by the treatment. I heard a year later that no fresh ulceration had taken place, and that the aneurism had not altered.

Carl P—, æt. 46. Two years previously he had strained his leg, and felt at the time severe pain in the left popliteal space; shortly after he noticed a pulsating tumour in the ham. For ten days the pain was so severe that he was forced to keep his bed; the swelling then almost disappeared, and he was able to resume his occupation. Two months before admission, while

going upstairs, he felt the same pain as before. A pulsating tumour the size of a goose egg again appeared in the popliteal space, and increased with rapidity up to admission, being especially aggravated by a long journey to Vienna. The patient, on admission, was strong and well nourished; the heart healthy; the radial arteries a little tortuous; the left leg flexed at the knee, and œdematous at the lower part. The entire popliteal space was occupied by a pulsating tumour the size of a fœtal head. By means of digital compression all pulsation in the aneurism was stopped, but the leg became livid and cold. The part where the pressure was applied became so tender that the patient would not submit to the treatment any longer, and the pulsation returned as before. I then exposed the femoral artery at the inner border of the sartorius and applied my arterial clamp (described in the author's 'Kriegschirurgischen Briefe,' p. 160). As the instrument was well borne, I tightened it until the pulsation in the aneurism ceased. Three days later I relaxed the clamp a little, but the pulsation immediately returned, and I found that no clot had formed either at the seat of pressure or below the clamp. After the clamp had been applied for five days I introduced a fine acupuncture needle into the aneurism, in order to satisfy myself whether any circulation was going on deep down. That this was the case was proved by the distinct pulsation of the needle. Suspecting that the pressure of my instruments had not completely controlled the circulation through the aneurism—probably owing to a too free collateral circulation—and fearing lest too long-continued pressure should lead to sloughing of the artery, I removed the clamp. The instrument was hardly taken off when the artery recovered its cylindrical shape, proving that no thrombus had formed at this spot. The pulsation and the pain recurred again at once. A day or two later severe hæmorrhage took place from the wound; the nurse compressed the artery effectively beneath Poupart's ligament, and the vessel was secured by two ligatures. On tying the upper thread the hæmorrhage ceased; the lower thread was not drawn tight, but left in the wound for precaution. The next morning the aneurism no longer pulsated but was tense and the skin discoloured. As I feared that the clamp might have caused the artery to slough, I exposed the vessel freely, passed a double ligature under it, and removed a portion of the vessel an inch in length. This piece was of a greyish colour, and perforated by a small aperture corresponding to the lower claw of the clamp. Pyæmia developed after the operation, and he died a fortnight later. Post mortem: suppurating thrombosis was found in the femoral vein, and metastatic abscesses in the lungs and brain. An opening of the diameter of a bean formed the communication between the popliteal artery and the aneurism; the rest of the vessel was healthy.

Popliteal aneurism; compression; ergotine injection.

Joseph B—, æt. 40, a labourer. Two years previously he had noticed pain in the right popliteal space occurring from no known cause. When admitted he had an aneurism the size of a fœtal head; the knee was flexed, and the leg œdematous. Compression was at once commenced. In the course of a

month the aneurism was distinctly smaller and softer, though there was still decided pulsation. Compression was continued, and in addition an ice-bladder was kept to the part. A daily subcutaneous injection of ergotine was ordered; the injections were persevered with for thirteen days, but were then discontinued owing to redness about the leg. The aneurism certainly did not diminish during this period; the pulsation, indeed, appeared to be rather more marked. A week later the injections were resumed and continued for twenty-two days, but again without improvement. After an interval of a month the injections were again resorted to and continued for three weeks, again without leading to any material improvement. By means of the pressure the pulsation had so diminished as to be scarcely perceptible. Once more the ergotine treatment was employed as on the previous occasions, but the treatment was discontinued, as small abscesses formed. After seven months' treatment the patient was discharged at his own earnest request. The aneurism had diminished to one half of its original size, and the pulsation was very slight. Of his further history I only know that three months after his discharge he was in good health.

Antyllus's Operation for Aneurism. Treatment of Aneurism.

Antyllus's operation is a kind of treatment more easily adopted now that we can employ local anæmia. I do not deny that it may be suitable for aneurisms of small arteries,[1] and for traumatic aneurisms where the sac has given way, more especially in these days when the antiseptic method prevents any undue amount of suppuration: at the same time my experience of the operation up to the present does not lead me to estimate it very highly, for the following reasons:—The inner surface of these large aneurisms mostly consists of breaking down or sloughing tissue, which can never be wholly removed without causing serious hæmorrhage from the dilated collaterals. The prospect of any rapid healing is therefore very slight. Again, a considerable extent of the artery is often so rotten and soft that secondary hæmorrhage is almost the rule, and this is really favoured by the use of catgut ligatures, for the tissues over these ligatures do not become adherent together. I fear that in cases of large traumatic aneurisms of the thigh, associated with inflammatory symptoms and fever, amputation is the surest method of saving life, and should be adopted more frequently than has hitherto, perhaps, been the case.

The hopes that I formerly entertained of the treatment of

[1] See two cases of aneurism of the radial artery treated by this method recorded above, p. 377.

aneurism by ligature and arterial closure (arterienklausur) I am bound to say have been rather disappointed. The cases have been so few that each one has been more of the nature of an experiment. Recent experience has added still more to my satisfaction with the success of instrumental compression. No doubt perseverance is required both of surgeon and patient, and the latter ought to understood and co-operate in the treatment. The frequent employment of the elastic bandage so as to envelop the entire extremity, is of material assistance in this method of treatment. At first, the bandage can only be kept on for a few minutes, but subsequently it can be tolerated for half an hour at a time and several times daily, if the patients have determination. I was surprised on observing that by this method the aneurism does not at first become solid from the formation and collection of blood clot, but that long before this change takes place the sac becomes softer and smaller. The solidification of the tumour and the cessation of pulsation are of course the most favourable signs to be looked for, and are brought about, not by the organisation of the clot, but by the shrinkage of the sac to its smallest possible dimensions. The diminution of the intra-aneurismatic pressure leads to the shrinkage and the cure is completed by the filling up of the sac. The clot must be absorbed, and this can only be accomplished by means of the vessels supplying the aneurismal walls. The shrinkage of the sac must progress simultaneously with the resorption, and to such an extent that the cavity entirely disappears. In one case, the sac appeared to have become entirely shut off from the opening in the artery, without any coagulation of its contents; after the removal of the bandage the aneurismal sac was still of its former size, soft and fluctuating; absolutely no pulsation could be felt in it, nor was any bruit audible. The explanation of the fact that the fluid blood was not absorbed could evidently be only due to the slight vascularity of the sac, a condition which had perhaps been caused by the firm bandaging of the limb. Remembering this case, where the blood remained fluid in a sac which, to all appearances, was no longer connected with the tube of the artery, and also my unsuccessful attempt to close the artery by means of instruments, I have been led to doubt whether we are correct in supposing that the blood can only be preserved in a fluid state if the walls of the vessels are normal.

These observations and reflections led me to the conclusion that

an aneurism is not completely cured until the sac has entirely shrunk up; the formation of coagulum is but a means to gain this end; I do not, therefore, consider a treatment rational which seeks to bring about the formation of coagulum by direct chemical means. By electro-puncture and injection of Liq. Ferri, coagulum can be formed artificially, or indirectly by acupuncture, but the complete coagulation of the aneurismal contents cannot be produced without risk to the patient. These methods of treatment, partly from mechanical, partly from chemical causes, set up irritation of the sac walls and may thus induce cicatricial shrinking; we cannot, however, predict whether the inflammatory process will stop short at the proper time. In this fact lies the uncertainty and danger of such treatment; without, therefore, denying the possible efficacy of this method, I find no inducement to continue its experimental adoption.

The number of my cases is too small to enable me to state the time required for cure by compression; in my patients this period varied between a few days and many months. Undoubtedly digital compression has many advantages, but there are so many practical difficulties in the way of applying it that I prefer instrumental compression.

Genu Valgum.

Most of the cases of this nature which I met with at Zürich were treated by mechanical apparatus of various kinds. In the case of a man æt. 25, with a very high degree of knock-knee (Baker's leg),[1] I divided the external ligaments of the knee subcutaneously on both sides. The results, with respect to subsequent treatment, were very gratifying.

A child æt. 7, with genu valgum, came under me, who had been treated as an out-patient for some time without success; the limb had been kept in a flexed position by means of a plaster bandage. For this case I devised a special kind of apparatus. The thigh and the leg, including the foot, were enveloped in a plaster bandage over a layer of flannel; the knee was left uncovered. On the inner side of the thigh piece a stout strip of wood was placed, a little shorter than the limb; this was kept in position by

[1] Billroth's 'Path.,' Hackley's Trans., p. 529.

another plaster bandage, and connected to the leg by means of elastic bands. After two months, during which period the apparatus was renewed but once, the deformity of the foot was found to be corrected. On account of the laxity of the ligaments, the whole limb was then encased in a plaster bandage, in which the child was able to walk about fairly well. This method of treatment is of value in certain cases and has the advantage that the patient is not altogether confined to bed. In the out-patient department we frequently employed methods such as this, or plaster bandages frequently renewed, bringing the foot into as good position as possible when applying the bandage. Considerable benefit was derived, but the patients generally left before they were completely cured.

Genu Valgum and Varum.[1]

In twenty-six cases of genu valgum, I employed "redressement forcé." With a little practice, it is usually possible to straighten the limbs easily without any apparatus. Before experience had taught me the right amount of force to exert, in order to rupture the ligaments with certainty yet without undue violence, I resorted to subcutaneous division of the external lateral ligament in one case and the biceps tendon in others. Although the immediate results of "redressement" are satisfactory, yet convalescence is so slow and the liability to complications so great that I doubt whether I shall ever adopt the plan again extensively. I may refer to Mikulicz's work on the subject.

Unless the ligaments are completely torn through with a wrench, very little good will be done. If the thigh is padded and put up in a plaster case after the operation, bed-sores are apt to form, and sometimes the pain is very severe. If, on the other hand, the ligaments are completely torn through, and the leg brought into a position of genu varum, which it is easily possible to do, the peroneal nerve may be so stretched that it will lose its functions, and the paralysis thus caused does not always disappear, but may possibly cripple the patients permanently. A very long time elapses before the torn ligaments unite again; the knees for

[1] With regard to my treatment of these deformities, I may refer to essays by Drs. Gussenbauer and Mikulicz published in the 'Archiv für Klin. Chir.,' Bd. xviii, pp. 1 and 375, and Bd. xxiii, pp. 561 and 671.

months are loose and weak and the patients are sometimes unable ever to walk again without some apparatus.

In thirteen cases I performed subcutaneous osteotomy of the bones of the leg with the chisel. Unfortunately two of these patients (one after double osteotomy, and another after osteotomy of the right leg only) died of sepsis and pyæmia. In the first case the pressure of the bandage set up septic phlegmonous inflammation of the leg, and in the other instance suppuration of the bone. With regard to the details of the operation, I may state that the osteotomy of the tibia must be made as complete as possible, so that the infraction may be easy.

If too many attempts at infraction be made before the osteotomy is completed, the external lateral ligament becomes loosened, and eventually ruptured. The patients then lose all the advantage in the saving of time which the osteotomy might have granted them. The leg should not be padded after the osteotomy, but placed and kept in its new position without too much strain. If there is much difficulty in straightening the limb, one may easily be led to apply the bandages so tightly as to exercise considerable pressure on the soft parts, and thus set up phlegmonous inflammation as in the fatal case already mentioned. In all these cases of osteotomy the bandage was either not removed till the cure was completed (provided there were no pain or fever), or else a window was cut in it and open treatment adopted.

The following case of spastic talipes (hysterical reflex contraction) presents some unusual features.

Emma F—, a Jewess, æt. 19, stated that nineteen days previously to admission she had fallen and sprained her right foot; immediately after the accident she noticed that the position of the foot was unnatural, and it had remained so since. I found that there was no dislocation, but that the varus was due to spastic muscular contraction. There was a little swelling on the dorsum of the foot, which disappeared under simple treatment, but the deformity became rather worse; the extensor longus pollicis became contracted to such an extent that the great toe was hyper-extended at a right angle to the metatarsus. Galvanism was tried for a time without any benefit. Under chloroform and also during sleep it was found that the foot resumed its normal position; the moment the patient awoke the varus again became evident. She complained of intense pain when forcible attempts were made to straighten the foot. The foot was then straightened under an anæsthetic and put up in plaster, but the bandage had to be removed after a day or two. On using the actual cautery the deformity would disappear for a few moments. She went under Professor Benedict, who tried an orthopædic

apparatus with india-rubber bands, but without any benefit. She then came under the care of Professor Dumreicher, who divided the tendo-Achillis and, subsequently, numerous other tendons, but without any benefit except for a very short time. If the patient were kept quiet in bed, the displacement was very slight.

Congenital Talipes.

It is now well known that in congenital talipes the shape of the tarsal bones is abnormal, and that the abnormality increases if the individuals walk about on their club feet. All that we, as surgeons, usually do, in order to cure club foot, is to enable the foot easily to be brought into a natural position and kept so by means of a proper shoe. It is the business of the resident surgeon to see the treatment properly carried out, that is, that the shoe fits well, and that the foot cannot shift about in it. Curiously enough, there seem to be many members of our profession who so little appreciate the anatomical conditions that they suppose the treatment to be comprised in tenotomy. Not infrequently in private I see cases in which years previously tenotomy—and tenotomy alone—had been performed. The parents suppose that the ill success was due to incomplete operation. As far as lies in my power, I urge again and again upon my pupils that tenotomy is only a means to accelerate cure. The treatment of talipes according to our present principles and methods is so eminently satisfactory that I trust practical surgeons will no longer abstain from carrying it out thoroughly.

While at Zürich thirty-seven cases of congenital talipes came under treatment. This number appears to me comparatively large. The list included only one adult—a girl 21 years of age. After long treatment with Scarpa's shoes,[1] she was sent out, able to walk with her feet flat on the ground. The children usually came under treatment when from one to twelve years old. I used sometimes to treat them with plaster-of-Paris splints—rarely with mechanical appliances. The tendo-Achillis was divided in about one half of the cases. If the parents of these children lacked the patience or money necessary for the completion of the cure the patients were provided with a Scarpa's shoe and discharged. We were usually forced to discharge the patients rather early on account

[1] 'Schienenstiefel.'

of the want of room—too early at least for the children of poor people who are not always in a position to get the shoes repaired, for if the best possible result is to be obtained well-made shoes must be worn for years. It is in this respect that in ordinary practice the cure is most commonly thwarted; in most cases we have to be content if we can enable the children to walk on the flat of their feet. If the shoes are left off too early or the treatment is not completed, and the children learn to walk either in large shoes or without any, the entire treatment is thrown away. Orthopædic surgery among the poor is only possible in institutions which are richly endowed or in wealthy children's hospitals, where the patients can be kept under treatment for a number of years. As far as I could learn about the subsequent conditions of the patients the results were not very satisfactory. Thus, in thirteen children with double talipes, I received the following reports in eight instances:— Of four, "can walk fairly though the foot is turned inwards;" of three, "can walk alone," "can walk freely," of another, "cannot put his foot to the ground properly;" of seven children with talipes only on one side, the report was, in two cases, "walks fairly well;" in three, "has trouble and difficulty in walking;" in two, "the foot is again completely deformed." It would be distinctly unfair to judge of what can be done in the treatment of talipes from these results, for the reports merely show the result of hospital practice among the poor, while they prove that longer mechanical treatment is necessary in children's hospitals to ensure more certain cure.

My figures showed—(1) that double talipes is about twice as common as single; (2) that unilateral talipes is not more common on one side than the other; (3) that male children are far more frequently afflicted than female. I do not think that there is any particular advantage in commencing treatment before the children are a year old; the feet ought to be properly fixed in suitable apparatus before the first attempts to walk are made. I often used to bandage the feet to hollow tin splints with wooden foot-pieces. With these the patients are able to stand and walk.

A larger number of cases, seen at Vienna, confirmed the general inferences drawn from my Zürich list. I have often practised subcutaneous division of the plantar fascia as well as that of the Achilles tendon. I have never yet found it necessary to divide any other

tendons or fasciæ. In a case that came under my care at Zürich (described in the 'Archiv für Klin.,' Bd. 1, p. 488), and in which I applied a plaster bandage directly after tenotomy and *redressement forcé*, deep gangrene of the foot took place. Now, I always allow the wound of the tenotomy to heal before I apply the bandage. After the tenotomy I always now treat talipes in the following manner, with the ultimate results of which, as well as with the rapidity of cure I am well satisfied.[1]

"Four or five days after the division of the Achilles tendon, when the little wound has healed up, the foot is seized in the hand and brought as straight as possible, care of course being taken not to employ too much force. At the same time, while the leg is held firmly below the knee by a second person, a plaster-of-Paris bandage is quickly applied over a moderate amount of wadding. This bandage reaches from the toes up to the middle of the leg. The padding must not be too thin at the bend of the foot, or else as it is forced into position the bandage might press the part. While the plaster is still soft the knee of the affected side is bent to a right angle and the flat of one hand is then placed over the sole, and the other on the lower end of the thigh, so that the palms of the two hands face each other. If now the sole of the deformed foot is pressed upwards and outwards with one hand, and at the same time pressure is exerted on the knee with the other in the line of the long axis of the leg, the foot may be brought as near to the normal position as it was before the application of the bandage; the resistance is limited to the muscular action of the affected limb. The foot is then kept in its new position by steady pressure of the hands for a few minutes, till the increasing warmth of the bandage proves the plaster to be sufficiently hard.

This method of treatment can be employed on children under two years of age without the use of any anæsthetic, and without more assistance than that of the person who holds the child.

The pressure ought only to be applied to the sole as the foot is forced into position. If the whole foot be seized in the hand and the "redressement" effected while the bandages are on, the pressure of the fingers will cause the inner surface of the plaster to project and may lead to injurious pressure on the dorsum of the

[1] The following section on the treatment of club foot in adults is translated from a paper by Dr, Gersuny, of Vienna, in the 'Wien. Med. Woch.,' 1878, Bd. xxx, p. 822, and refers to Professor Billroth's practice.—[Ed.]

foot. In older persons an anæsthetic is necessary, and more force is required. The *redressement* can be effected by pressure with the flat of the hand under the sole, while an assistant fixes the leg firmly in the extended position.

The apparatus is always renewed in from two to three weeks. In children of a year old the entire treatment lasts from two to three months, and from three to five plaster bandages will suffice. Immediately after the removal of the last bandage, a simple apparatus to support the part, consisting of a shoe with two lateral splints, is applied. A catch in the hinge corresponding to the ankle-joint prevents counter-flexion of the foot to more than a right angle, while a strap presses on the part where the foot is most curved.

When the splints only reach up to the knee, the foot readily turns inwards—a circumstance which may interfere with a successful result. It is better, therefore, that the splints should extend higher up, and they should be first fixed above with a pelvic girdle, as by this means the leg can be completely prevented from rolling inwards.

After this, as after other modes of treatment, the condition will return if grossly neglected, but it should not if a moderate degree of intelligence on the part of the relations be exercised; if they will but learn how to apply the simple apparatus properly, they may by means of it effect a permanent cure. The following case will serve as an illustration of the treatment.

The patient was a girl, æt. 20, who was born with talipes of the left foot. When a year old she was taken to a well-known orthopædic institution, where she remained under treatment for eighteen months. I was unable to find out the condition of the foot on her discharge, but very soon after she left further medical treatment was necessary; still, no complete cure was effected. When seen the patient was stout and strong; she had a slight lateral curvature as the result of her limping walk and a tolerably high degree of talipes varus in the left foot. At the transverse articulation the foot was so sharply bent inwards that there was a deep sulcus on the inner border, the anterior and posterior parts of the foot forming something under a right angle. In addition, her foot was strongly supinated, so that in walking only the outer part of the metatarsal bone touched the ground. On both extremities of this bone were callosities. The ankle-joint was so twisted that the external malleolus was markedly more posterior than the internal. On the outer side of the dorsum of the foot the astragalus formed a decided projection. To complete the description, the great toe was flexed on the dorsum at nearly a right angle with its metatarsal bone, and the extensors would not yield so as to allow of its being straightened.

The condition of the foot when first seen seemed to demand either excision of a wedge of bone, as practised by Davy and v. Meusen, or *évidement* of the astragalus, as performed by Verebélyi. As the patient was unwilling to have an operation of any magnitude performed, and stated that she would be satisfied with a partial cure, I decided on orthopædic treatment. The plantar fascia was first divided subcutaneously beneath the sharpest bend of the foot, and six days later under an anæsthetic the first plaster bandage was applied in the manner described. The improvement at first was so slight that my previous expectations were much moderated, but when after three weeks I tried *redressement*, I found that the bands were more yielding. Altogether five plaster bandages were applied, and when I removed the fifth bandage after four months of treatment, the shape of the foot was almost normal. This seems a strong statement, but on comparing the plaster casts taken before and after treatment it was seen that it was no exaggeration; the foot was straight, the cleft of the inner border had disappeared, the astragalus had sunk back into its place, and the great toe was in its proper position. In walking, the sole of the foot was perfectly normal as it touched the ground, and the only remnant of the former deformity was the excessive curve on the inner edge of the foot. Of course, the right foot was not the same as the left, inasmuch as its growth had been much restricted and it was distinctly shorter than the right.

By the help of a supporting apparatus and a pelvic girdle, the patient soon learned to walk perfectly well, and was sent home highly delighted with the improvement.

Possibly in this case a cure might have been effected in a shorter time than four months by excising a wedge of bone, but the result could hardly have been better. Indeed, it could not have been so good, for the foot, which was already too short, would have been still more curtailed by such an operation."

Osteotomy for Ricketty Deformities.

While at Zürich I performed subcutaneous osteotomy on four children, whose ages varied from two and a half to three years, for ricketty deformities of the legs. The operation was performed after the rachitic process had ceased. The result was highly satisfactory in all, and very slight reaction followed the operation. In every case the limb was straightened immediately after the osteotomy, and then put up in plaster bandages, a small window being cut over the wound.

The following case of softening of the bones is of some rarity; I

know not whether to classify it as one of osteoporosis, rachitis, or halisteresis.[1]

A lad, æt. 12, strong and stout for his age, was admitted with some shortening of the left leg, which caused him to limp very considerably. The lower half of the limb had a most typical ricketty curve. He walked on the outer edge of his foot, and had some pain in so doing. It was stated that he had suffered from scarlet fever when three years old, that the leg had then become bent, and that the curve had gone on increasing ever since. The bone was bent at an angle of forty-five degrees. Under an anæsthetic I was able to straighten the limb without applying any great amount of force; the leg was put up in a splint, and a few days later in a plaster bandage. Large quantities of lime water and milk were given internally. The patient was discharged soon after, as he was able to walk with crutches. I heard a few weeks later that the bandage had been taken off soon after he got home, and the condition had thereupon returned as before.

Congenital lateral dislocation of the toes.

A strong man, æt. 61, was admitted with the following congenital deformity of the toes. In the right foot the head of the first metatarsal bone was displaced laterally, and lay beneath the skin on the inner edge of the foot; the great toe was displaced outwards; the fifth toe was displaced in a similar manner. In the left foot the deformity was the same, except that the second toe was completely dislocated.

I am only acquainted with two other cases of a similar nature: a man with congenital lateral displacement in both hands of some of the fingers at the metacarpo-phalangeal joints, and a girl who came under my treatment with a similar malformation of the hands.

Pes gigas.

The illustration (Fig. 24, next page) represents a congenital pes gigas in a boy, æt. 9. The second and third toes were abnormally developed, together with the central portion of the foot and the panniculus adiposus.

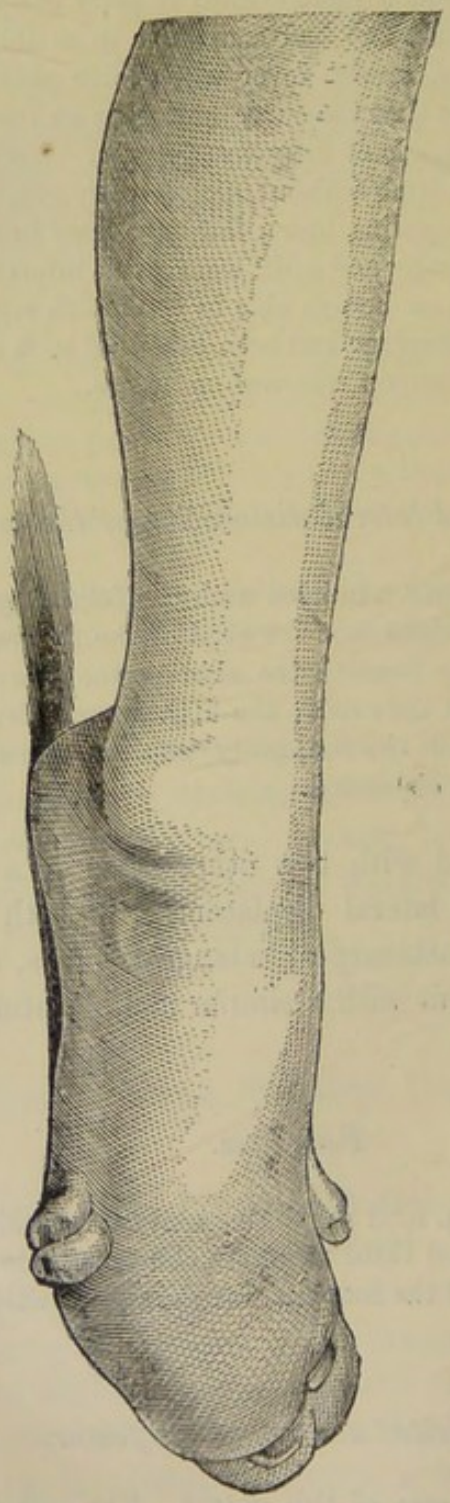
Congenital absence of the femur.

Plate XII illustrates a case of this nature. The patient was admitted

[1] 'Halisterischer Knochenatrophie' of R. Volkmann.

for severe cystitis and pyelitis, and died two days after admission. The drawing was taken immediately after death. Unfortunately no post mortem was allowed.

FIG. 24.—PES GIGAS.



CHAPTER XVIII.

ON STATISTICS OF AMPUTATIONS, RESECTIONS, AND OSTEOTOMIES.[1]

We have long been accustomed to set great value on the results of amputations and resections, and not only to form an opinion of the different methods of operating and of after-treatment from such statistics, but also to look upon them as a test of operative surgery generally, as well as of sanitary and hygienic administration. Much may be said against and much in favour of such a view. In favour of it may be said, that it is easier to tabulate these operations categorically than any others, and that, in this branch of operative surgery, cases resembling each other can be taken as a basis for statistics. Further, these operations are particularly liable to complications, owing to the injuries inflicted on the skin, cellular tissue, muscles, large vessels or bones, and as they demand careful circumspection on various points are thus best adapted to enlighten us. On the other hand, it may be said that the similarity of the cases is not so great as it would seem at first sight, and it is only by the necessary grouping together of the several cases at the discretion of the operator that a practical basis for statistics can be made. It might be said that the treatment of large cavernous wounds after the removal of tumours, especially the more critical operations, such as laparotomies, give us a far wider field of view than do amputations, and constitute a much better criterion of the state of our knowledge. No doubt it is possible that as the operation of laparotomy becomes more extensively and more frequently practised, this point of view may assume a more prominent position hereafter. For the present, laparotomies are not of sufficiently frequent occurrence in the surgical wards of our hospitals, to form a basis for general statistics. Again, operations for the removal of tumours, with the single exception perhaps of simple cases of

[1] Some additional statistics by Dr. A. Wölfler will be found in the 'Wien. Med. Woch.,' April, 1881, No. 17 *et seq.*—[Ed.]

amputation of the breast, are not so generally and equally distributed that they would fulfil the required conditions; at present, therefore, we practically adopt the amputations and resections performed in the different hospitals which have surgical departments as the principal test and indication of the results of operations for given periods of time.

It soon became clear that the cases must be grouped according to stated principles, if any practical information were to be gained from the statistics. Some thirty years ago the "method of amputation" was thought so much of that the results were usually estimated accordingly. The first question was, whether circular, oval, single or double flap amputation had been performed. These considerations are almost disregarded now; the principles on which an amputation stump ought to be covered in are generally accepted; we know that to form large muscular flaps is not only unfavourable for healing, but that these masses of muscle in the stump at a later stage disappear here and there, according to recognised anatomical and physiological conditions. I do not think I am wrong in assuming that the principles of forming the stump in an amputation, as represented by two or three circular cuts (with the exception of special methods of exarticulation), are now decided as far as the majority of surgeons are concerned, and that no great importance is attached any longer as to whether that result is obtained by a circular, simple, or a double-flap incision through the skin.

Contemporaneously with this discussion on the "method of amputation" the question as to whether the stump healed by first or second intention was held to be of great importance. When I was a student, a large number of surgeons still encouraged suppuration as much as possible by stuffing the flaps with charpie, and applying poultices early to the stump. Contention ran high, too, on the subject of the after treatment, whether the patients should be freely purged and bled (as a student I have seen many amputation stumps covered with leeches), or whether a liberal diet such as beefsteaks and port wine should be depended on for recovery.

These views obtained during a period when no statistical results of value could be hoped for, for no surgeon considered it his duty to publish openly the truth as to the results of his operations; practically he was unacquainted with them and could only furnish some very general observations on the subject according to the impressions made on his memory.

The first comprehensive statistics of amputations were published by Malgaigne, who took them from the journals of the Parisian hospitals. Individual surgeons were thus exempted from being personally answerable for the results shown, which reflected the state of the surgical art as such. Unfortunately, they were so unfavourable that it was made on that account easier for individual surgeons to publish their results themselves, for with the advancing improvement of our art they became gradually better.

It had long been clear on purely empirical grounds that after the "method of amputation" and "the early union or non-union of amputation wounds" there were other circumstances, such as the conditions demanding amputation and the period of the wound and of the illness during which operation was performed, which had the most important bearing on the result. Military surgeons had long been discussing whether amputation ought to be performed immediately after the injury (primary) or at a later period, when the gunshot wound had begun to suppurate (secondary). The Paris Academy, in 1745, offered a prize for an answer to this question. Subsequently it was found that, speaking generally, amputations for injuries yielded more unfavourable results than amputations for chronic suppurations, tumours, etc., and thus arose the system of grouping amputation cases which is now fundamentally adopted in most statistical tables; indeed, this point till a few years ago was held of such paramount importance that the method of operation and the after-treatment were scarcely mentioned.

The popularisation of pyæmia, especially the fact that this disease was looked upon as one almost entirely due to hospital miasmatic influences, for a while diverted attention entirely from the wound and the patient, and made the fate of the case depend almost entirely on the surrounding atmosphere. The favourable results obtained in the hastily-constructed hospital huts during the American war, added to Simpson's crusade against hospitalism, together converted surgeons into builders, and builders into surgeons; it seemed for the time, almost as if it were a matter of perfect indifference how and when amputations and resections were performed, and how the after-treatment of the wound was conducted, provided only the patient were kept in the open air, or in a well-ventilated locality. The great object now was to group together amputation cases which had been treated in private practice, next those in small hospitals (which by *a priori* reasoning were held to be, after private

dwelling-houses, most suitable for these cases), and finally in the large city hospitals (the so-called "Mordhöhlen" for wounds and operation cases).

Simpson himself contributed not a little towards directing the attention of surgeons again to the importance of the treatment of the wound, when he introduced acupressure as a material aid to healing by first intention. Since acupressure was best adapted to the open treatment of wounds, both methods came into vogue together. Then followed the occlusion dressings, originating from the theories of the favourable healing of subcutaneous wounds. My readers will have seen how rivalry has sprung up between these older methods and that now so extensively adopted through to Guérin, Lister, and Volkmann. Now we are at another extreme, and it is the fashion simply to deny that the hospital or locality in which the amputation case is placed, exercises any effect, and to repudiate any subjective influence of the sick or injured person on the healing, provided only the wound be protected with a good Lister's dressing. Consequently statistics of amputation are produced, in which the open treatment of wounds or the antiseptic occlusion dressing serve as the basis for the tables, and the other circumstances are only incidentally referred to.

Since, in the comparative short period of about twenty-five years, I have experienced myself all these metamorphoses of amputation statistics which I have by no means over-coloured or exaggerated, the reader will readly understand that I can scarcely persuade myself that we are in a condition now from which we shall not alter. Hitherto, we have always progressed, notwithstanding our temporary partialities, and now that we find ourselves again with this one partiality, we may hope that it will not be the last. It would not astonish me if we were to obtain better results by simpler methods, or perhaps adopt principles entirely opposed to those of the present day.

There are many advantages in the new mode of tabulating amputations, which Volkmann brought before the Surgical Congress in 1877; it is especially adapted to show the excellent working of the antiseptic method—a method practised by Volkmann himself in so admirable a manner—and appears also to me, not only to give a good idea at a glance, but also to be very practical in general.

The principal features of Volkmann's arrangement I have adopted

in tabulating my cases, although I met with many difficulties, which could not be overcome by any system of classification.

My cases of amputation (between 1860 and 1876) were divided into the following classes :[1]

(A.) Uncomplicated Cases.

I. *Cases in which the patients either recovered and were discharged, or died of exhaustion or accidental diseases of wounds.*—Under this heading we have 214 cases. In 75 amputation was performed for injury, and in the others for various causes, such as chronic caries, syphilitic gangrene, malignant tumours, frost-bite, pseudarthrosis, etc: 150 recovered; 64 died. Of the deaths 9 were from exhaustion (collapse and marasmus), 3 from erysipelas ambulans, 2 from delirium potatorum, 15 from septo-pyæmia. In this group, therefore, the mortality amounts to 29·9 per cent.

(The amputations tabulated in the pages referred to are of every variety. In the upper extremity twelve of the amputations were at the shoulder-joint; eight recovered and four died. Two were amputated through the elbow-joint, while in nine the hand was disarticulated; all the latter patients recovered. In the lower extremity Symes' amputation was performed only twice, Chopart's six times, Lisfranc's once. The operation generally adopted was Pirogoff's, which was performed in thirty-two cases, twenty-six being caries of the foot. This latter operation appears to find far more favour on the Continent generally than it does in this country.—Ed.)

With regard to the two columns in the tables of "recovered" and "died," a good many points have to be taken into consideration. A patient was entered as "recovered" if he left the hospital with his stump healed, or nearly healed, although perhaps he may have died of tuberculosis a week later. We must not quite adopt the charming notion that the patients who are entered as having recovered from amputation recovered also from any severe general diseases they may have had. Again, the expression "recovered"

[1] Owing to want of space the tables—though the results shown by them are highly interesting—could not be reprinted entire. They will be found in the 'Wiener Bericht,' 1876, pp. 613—626. In what follows I have merely picked out a few of the salient points.—[Ed.]

does not bear that full significance in many of the cases of caries, which are a very numerous class. If, for example, a patient with tuberculosis of the lungs were discharged with his stump healed, or nearly so, he was put down in the tables as "recovered," but if, for some reason or other, he remained in the hospital till the time of his death, his case was entered in another table. In large hospitals it is impossible to obviate entirely such sources of error. The class of "amputations on account of injuries" corresponds, generally speaking, to that formerly employed of "primary amputations," but in order to avoid multiplying the number of groups, I have included a few cases in which amputation was performed at a later period, as, for example, where by gradual necrosis or suppuration (the patient not being pyæmic) the skin was so far destroyed that the wound could not be expected to heal up. I agree altogether with Volkmann in rejecting the groups of "intermediary" and "secondary" amputations, and substituting for them a class "where septo-pyæmia has already developed at the time of amputation." The surgeon must often be in grave doubt as to the class in which he is to enter this or that case, and the lists of "intermediary" and "secondary" amputations not infrequently included very diverse cases.

With respect to the rather numerous deaths from tuberculosis, it must be noted that I often performed amputations of the foot, the leg, or the arm, in order to relieve patients from the pain of carious joints.

Volkmann enters delirium potatorum as one of the "intercurrent diseases having no direct connection with the wound." This conception of the condition I do not share. Acute fatal cases of delirium potatorum, are, according to my view, set up in drunkards by intense inflammation of the absorption of phlogogenous matter from the wounds or the parts around. I consider the delirium therefore as an accidental disease of wounds, and classify it as such in my tables.

Comparing the statistics of amputations in my practice at Zürich with those at Vienna, I find an improvement in the latter of 10 per cent. I think there are two reasons for this:—(1) that in Vienna there were not nearly so many amputations for injuries, and far more from caries, (2) that in Vienna I adopted systematically the open treatment of wounds,[1] while in Zürich I practised

[1] See the remarks on p. 30, relating to Figs. 1 and 2, p. 29.

the older method which I had learned from my teachers, of sewing up the wound closely without draining it.

II. In this second class are tabulated cases (15 in number) in which the patients *died in the hospital from diseases which were not directly connected with the operation wound.*

Nearly all these deaths were due to tuberculosis of the lungs.

(B.) Complicated Cases.

I. *Operations on patients already the subjects of septic infection.*—Under this head are tabulated 69 cases, of whom 55 died and 14 recovered, showing a mortality of 79·7 per cent. It is important to separate these cases from the principal tables of amputation. For example, cases are included in this class where resection had been performed, and then pyæmia having occurred, amputation was resorted to, or where at the earnest entreaty of patients large tumours had been removed from the extremities, and then amputation was performed on account of gangrene and sepsis; others also in which patients with caries became pyæmic after examination of their wounds, and amputation was performed as a last resource. The majority of cases in this group, however, are those of injuries or phlegmonous inflammation, in which amputation was performed too late. I am aware that in many cases I did not recognise the danger sufficiently early, but a large proportion came under my treatment too late, and in many instances my hands were already tied. I never performed operations without the express consent of the patients, or in the case of children, of their parents or guardians. While in Switzerland I could not converse with the patients in their own dialect, and in Vienna I very often was unable to understand their language, except through the medium of an interpreter. It will be understood, then, that my power of over-persuading the patients was not very great, even when the operation was most urgent. Added to this, individuals of the working classes to whom amputation is proposed, not infrequently, after calm and rational reflection, prefer rather to die than to live crippled and unable to work—a point of view which, as a surgeon one cannot take, but which I cannot but hold is amply justified. These folk have often so little pleasure in life that they do not find it hard to part with it. This is especially the case in Vienna, where suicides are exceedingly common. Often, too, the sufferer

will reason thus: "When I can no longer work, I must beg; if I die my wife may support my children for a time and then marry again, but she cannot support me and the children for the rest of my life." But with many, as they feel themselves getting worse daily, the desire to live and the dread of death overcome their deliberate reasoning, and they eagerly clutch at the suggestion of amputation, which before they would not hear of. What should the surgeon do in such a case? His scientific knowledge says to him, "Too late;" but can he say the same to the patient? He may think so, write so, but he will not often do it. Who could say to himself, unless the patient was already in articulo mortis, "It is impossible for this man to recover?" Not I; for I have seen pyæmic patients pull through with abscesses in the lungs and cellular tissue, suppuration of the joints, and marked icterus. Not often it is true, but it happens so once in a way. We cannot estimate with any certainty the degree of septic poisoning which any individual person can get over. Thus I have often amputated in such cases where I felt that it would be a marvel if the patient recovered. Those who wish for good statistics of amputations would not operate on septic patients.

II. *Double amputations.*—Five cases, 3 recoveries and 2 deaths.

III. *Amputations on patients with other severe injuries.*—Two cases, both died. The separation made by Volkmann between the above two groups is as important as their distinction from Group I.

Summarising the list for sixteen years, I find that 315 amputations were performed on 305 patients. The mortality amounted to 45 per cent.

Excisions of Joints.

These cases are tabulated as follows:

(A.) Uncomplicated Cases.—I. *Cases in which the patients when discharged had recovered, or had only small sinuses, or in which death took place after the operation, owing to some accidental diseases of wounds.*—Statistics of this class will be found in the 'Wien. Bericht,' 1876, p. 627, where 90 cases are tabulated:—37 are excisions of the elbow, 8 of the wrist, 9 of the shoulder. In the lower extremity, 12 of the hip, 12 of the knee, and 12 of the ankle.

The other classes and groups are identical with those adopted in the tables of amputations. 46 osteotomies are recorded, 6 of which ended fatally.

CHAPTER XIX.

STATISTICS OF TUMOURS.[1]

I HAVE before now had occasion to remark, when reviewing the statistics of tumours in my Zürich records, that a summary taken entirely from the in-patient department can give no accurate idea of what a complete statistical return of tumours would show. In such a summary many cases of carcinoma of the stomach, the intestinal canal, and the liver, sarcoma of the brain and lungs (which it must be admitted are of rarer occurrence), carcinoma of the kidney, etc., would not be included, for such were treated in the department for internal diseases. Since surgical gynæcology has become a separate branch, most of the cases of cancer of the rectum, vulva and uterus, have been separated, and, in many university clinics, ovarian tumours also. Of fibroma of the uterus, only the rare cases have been included which came under operation. Many minor operations, such as removal of nasal mucous polypi, sebaceous cysts, hypertrophied tonsils, and angiomata, were treated in the out-patient department.

In the following tables primary tumours only are taken into account. Tumours set up by infection and metastatic growths are, of course, entirely excluded.

Comparing the proportionate frequency of tumours and of spontaneously arising acute or chronic inflammatory processes, I find that, taking the figures from 1860 to 1876, 2058 are classified under the former head (tumours), and 3061 under the latter (inflammations). The Zürich tables show that the number of acute and chronic inflammations far exceeded that of the tumours (1203 : 526) in Vienna the numbers were 1858 : 1532. It would, however, be rash to conclude that the population of Vienna is more

[1] See also on this subject, A. v. Winiwarter's work, 'Beiträge zur Statistik der Carcinome' (Stuttgart, 1878, F. Ecke), the materials for which were drawn from the clinic at Vienna.

disposed to tumour formations than that of Zürich. I think rather that the explanation lies in the fact that patients who had tumours were far less seldom sent away from the hospital in Vienna than those suffering from chronic inflammations. Of the latter class only a limited number could be admitted, owing to the long duration of the diseases.

The following table shows the frequency of the various forms of tumours :—

Carcinoma	862
Lymphoma	261
Cystoma	253
Sarcoma	245
Fibroma	163
Angioma	101
Lipoma	66
Adenoma	64
Chondroma	17
Neuroma	10
Osteoma	9
Papilloma	5
Echinococcus	2
	2058

The order of frequency differs from that in my Zürich tables (Z. B., p. 587 *et seq.*), because the classes of cystomata (which includes colloid cysts of the ovaries) and sarcomata were materially larger in Vienna.

The total number of epithelial new formations (carcinoma, cystoma, adenoma)=1179, or rather more than half of the total number of tumours (2058). It is interesting to note that these numbers almost exactly correspond with those of my Zürich tables. In a general statistical table of tumours, the preponderance of epithelial new formations would be far more marked, for a large number of uterine and gastric cancers would have to be added, while the number of connective-tissue new formations (fibroma, sarcoma, myoma, chondroma, osteoma) in the internal organs is certainly much smaller.

With regard to the distribution of tumours between the sexes, I find that in Zürich there were more male (299) than female (259) patients. In the above table, the number of females (1037) is slightly larger than that of the males, a fact which is pro-

bably accounted for by the ovariotomies. The difference is all the more striking in that the number of women admitted into the hospital was far smaller than that of the men, for I have three male and only two female wards. The number of tumours, therefore, occurring in women might be thought much larger, but a correction has to be made; men are so much more subject to injuries than women that the numbers will deceive at first sight; subtracting the cases of injury, I find that the distribution of surgical diseases is about equal in the two sexes. Still, after making this correction, I find that females are actually more liable to tumours. In men tumours of the face, principally cancers, constitute the only class which occurs with preponderating frequency; this is compensated for by the larger number of cancers of the breast in women. The larger number of cases occurring in the female sex is accounted for by the fact that the organs of generation are far more affected with tumours (cancers of the external organs of the uterus, fibroma of the uterus, ovarian tumours) than is the case with the male sex (cancers of the penis, testicle, fibroma of the prostate).

The marked preponderance of lipoma in the female sex is striking, and is probable accounted for by the greater development of the panniculus adiposus. Again, in angioma, the female sex (63) is far more often affected than the male sex (38), the difference being so material that all chance of accident may be excluded. This is all the more interesting, as in most of these cases we have to deal with congenital anomalies.

The following table shows the distribution of tumours in the various regions of the body:

Face, nasal, and oral cavities	712
The neck	395
Breast and back	349
Female organs of generation	147
Male organs of generation	114
Upper extremity	96
Abdomen and rectum	82
Lower extremity	73
Head and ear	54
Pelvis and lumbar regions	21
Urinary organs	15
Vertebral column	0
	2058

The different distribution of the various forms of tumours in the different regions of the body (and organs) is of acknowledged clinical importance and diagnostic interest, as has lately been very properly pointed out by Lücke. The practising clinical surgeon diagnoses with still more promptness and certainty from the situation of the tumour, for he knows what he is likely to meet with in this or that part. For one who has examined histologically many tumours whose seat of election is known, it is usually possible, by taking into account the situation, the consistence, and the rapidity of growth, to describe rightly the histological character of the tumour even in minute details, before making a section of the growth after removal. Of course it is true that in rare cases there is no guarantee against error, but experience can only be founded on the rule, not on the exception. From the tables given I select below for remark only those cases in which the numbers are relatively so large as to be of obvious import in the sense I have pointed out.

Fibroma was noticed most frequently in the male organs of generation (59 out of a total number of 163). The myo-fibromata of the prostate explain this prevalence. Its equivalent—myo-fibroma of the uterus—is only represented by twenty cases, a number which for reasons already mentioned is far too small.

The next largest number occurs in the division of the face, nose, and mouth, where fifty fibromata are tabulated, most of them being nasal and naso-pharyngeal polypi. Among the 23 fibromata of the breast, the largest number were adeno-fibromata of the mamma.

Lipoma (66) was most frequently situated in the breast and back (27), then in the upper extremity (18), especially on the upper arm and shoulder, and finally about the throat and back of the neck (10). The distribution of lipoma is peculiar in being especially restricted to the trunk.

Sarcoma (245) was most common about the face; the sarcomata of the jaws and gums (epulis-sarcoma) principally swell the total. Next comes the lower extremity (47), then the breast, (35, most of them being sarcoma and cysto-sarcoma of the mamma, also sarcoma of the skin, especially on the back) and the upper extremity (26).

The preponderating frequency of lymphoma (261) about the neck (219) is known to every surgeon, even of small experience.

Of 101 cases of angioma, most of which were congenital, 74

occurred in the face. This may be due to the fact that in the most common position of the head *in utero*, the venous circulation of the part is most liable to be interfered with; the resulting congestions may perhaps be the primary cause of these vascular growths.

Fifty-one cases of adenoma (out of a total of 64) were bronchoceles. (The other 13 cases are entered as occurring in the abdomen and rectum.)

Cystomata (253) were most common (95) in the female organs of generation, which is accounted for by the ovarian cystomata. Of 71 cases of cystoma in the neck, the majority were cystic bronchoceles. The 42 cystomata of the face include atheromata, cysts of the jaws and ranula. The 25 cystomata of the head were almost exclusively sebaceous.

Of the 826 carcinomata, 406, or nearly one half, occurred in the face and the nasal or oral cavities; 252 were in the breast, 52 in the rectum, and 56 in the male organs of generation.

The following table shows roughly the distribution of the tumours in the various tissues:

In the cutis .	499	871	1513=73·51 per cent.
„ mucous membranes	372		
„ glands . . .		642	
„ cellular tissue, fascia, fat . .		191	545=26·45 per cent.
„ lymphatic glands . .		249	
„ muscular substance of the uterus		17	
„ nerves . . .		10	
„ periosteum and bone . .		78	
		2058	

This table shows that tissues composed of epithelium and connective tissue together are most prone to the formation of tumours. The large number of growths starting from the integuments (the cutis and mucous membranes) together (871), as opposed to the glands (642), finds an explanation in the fact that the integuments are far more exposed to such external irritations as are likely to set up abnormal growth.

In the cutis (499) the carcinomata are especially numerous; next in order of frequency come the angiomata (69), sarcomata (59), cystomata (54, most of them being sebaceous). Of much rarer occurrence are fibromata (21).

Tumours attacking the mucous membranes (372, among which

are 171 cases of carcinoma) most frequently affected (257) the upper part of the respiratory and digestive tract. The number attacking the lower portion of the digestive tract (65 of the large intestine, among which are 52 cases of carcinoma) is far smaller.

Under the heading "glands" (642 tumours) the mamma stands at the head of the list (296 cases, of which 252 were cancer); next come the thyroid with 111, the ovary with 100, the prostate with 60 (58 being myo-fibromata), and the testis with 27.

Among the tumours of tissues composed only of adenoid substance (545), tumours of the lymphatic glands (lymphoma and lympho-sarcoma) amount to nearly one half (249). The propriety of including this group at all may be objected to *in toto* on two grounds—(1) because many of these lymphomata had suppurated or become caseous, and should be therefore entered as chronic inflammatory processes, and (2) because, undoubtedly, many of these growths originated deuteropathically by infection from protopathic sources of inflammation, and therefore no more belong to this category than do cancers and sarcomata originating in a similar manner. I myself cannot invalidate these objections, but only state in defence that it was not possible to make a strict separation of lymphomata in this sense. I am decidedly of opinion that primary affections of the lymphatic glands are of very rare occurrence, but as they are the parts which give passage to the fluids of the tissues as they pass on in their centripetal course, a strict separation would only be possible where heteroplastic new formations are found in the lymphatic glands.

In 191 cases the loose cellular tissue, the fasciæ and the fat were the starting-points of new formations. Lipoma and sarcoma occurred in equal numbers, 66 cases of each being noted.

Seventy-eight cases occurred in the periosteum and bones, including 46 cases of sarcoma, 13 of chondroma, 10 of cystoma (of the jaws), and 9 of osteoma. Cancers of the bones always originate, according to my view, in one of two ways, either by extension of the disease from without, or by metastasis. The latter class is not included here, and the former is tabulated under the heading of the tissue from which it originally started.

I have only noticed one case (a peculiar tumour of the muscles, myoma cysticum, 'Virchow's Archiv,' ix), in which I could make out from the histological character of the new formation that it had originated directly from striped muscular tissue. I have observed

new-formed striped muscular fibre in tumours of the testis,[1] and once in a sarcoma of the mamma.[2] Neither in Zürich nor in Vienna have I met with tumours whose origin from muscular bundles I could establish histologically; in all the cases it was just as possible that the growth originated in the connective tissue of the muscles.

The myo-fibromata of the uterus start undoubtedly in the smooth muscular fibre and investing connective tissue of this organ. The uterine glands are not included in these growths, and have no connection with them. Myo-fibromata of the prostate gland, although related histogenetically to the corresponding tumours of the uterus, nearly always include, so far as my investigations have reached, some portion of the epithelial glandular elements. However slightly we value the alteration of these epithelial elements (dilatation, enlargement, and increase of the epithelium and formation of retention cysts) and their influence on the histological character of the general mass of the tumours, these glandular elements still belong as essentially to the tumours as the included glandular elements do to fibroma and sarcoma of the mamma.

On histogenetic grounds we should be justified perhaps in dissociating these tumours which originate in connective tissue from any further relationship with the glands, and allowing the expressions "adeno-fibroma" and "adeno-sarcoma" to drop; on clinical grounds this change is not, at present, generally adopted. By changing over into other groups tumours which have not started from the epithelium, but which lie in the integuments and glands, we should simply augment the class of connective-tissue growths, and diminish that of the glandular tumours.

In the case of sarcomata, which in some measure agree with carcinomata, I have always kept as minute records as possible, for these tumours have been of special interest to me on account of the difficulty usually experienced with respect to their prognosis. I am able to make some statements as to their origin at the different periods of life.

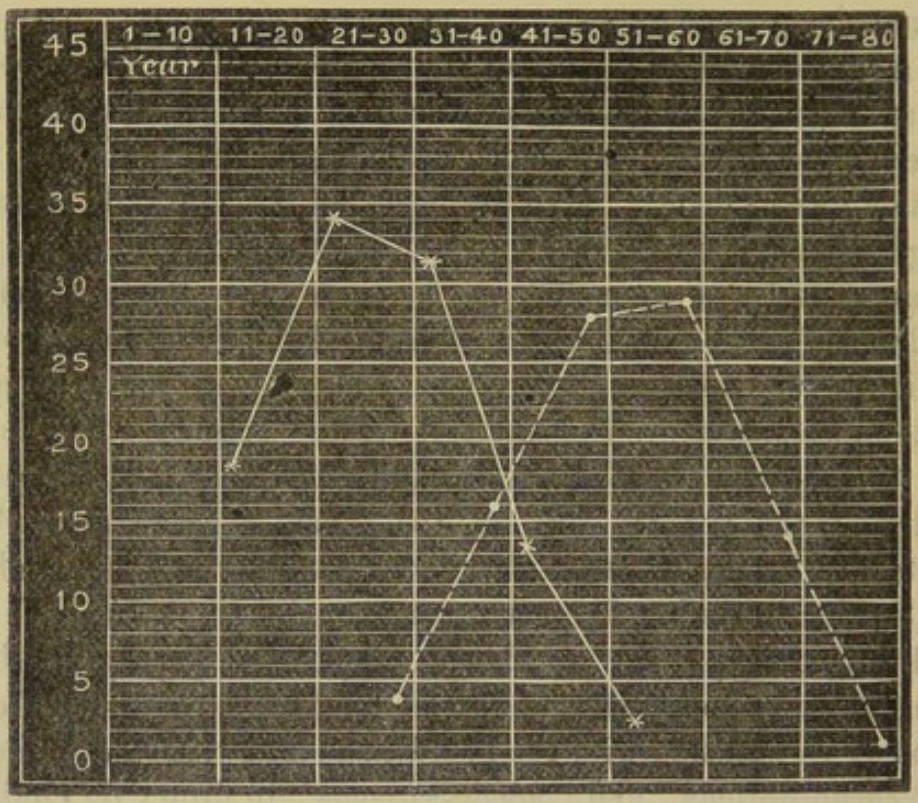
A. von Winiwarter has shown the proportions very clearly by means of charts, and has adjusted the inequalities of the sum total by always taking a hundred as the whole number, and calculating

[1] 'Deutsche Klin.,' 1855, No. 7; and Virchow's 'Archiv,' Bd. viii.

[2] 'Untersuchungen über Brustdrüsengeschwülste;' 'Virchow's Archiv,' Bd. xviii.

the numbers for the different periods of time marked off in the tables, in their proportion to one hundred. The curves in the chart (Fig. 25) illustrate the frequency of adeno-fibroma and adeno-cysto-

FIG. 25.



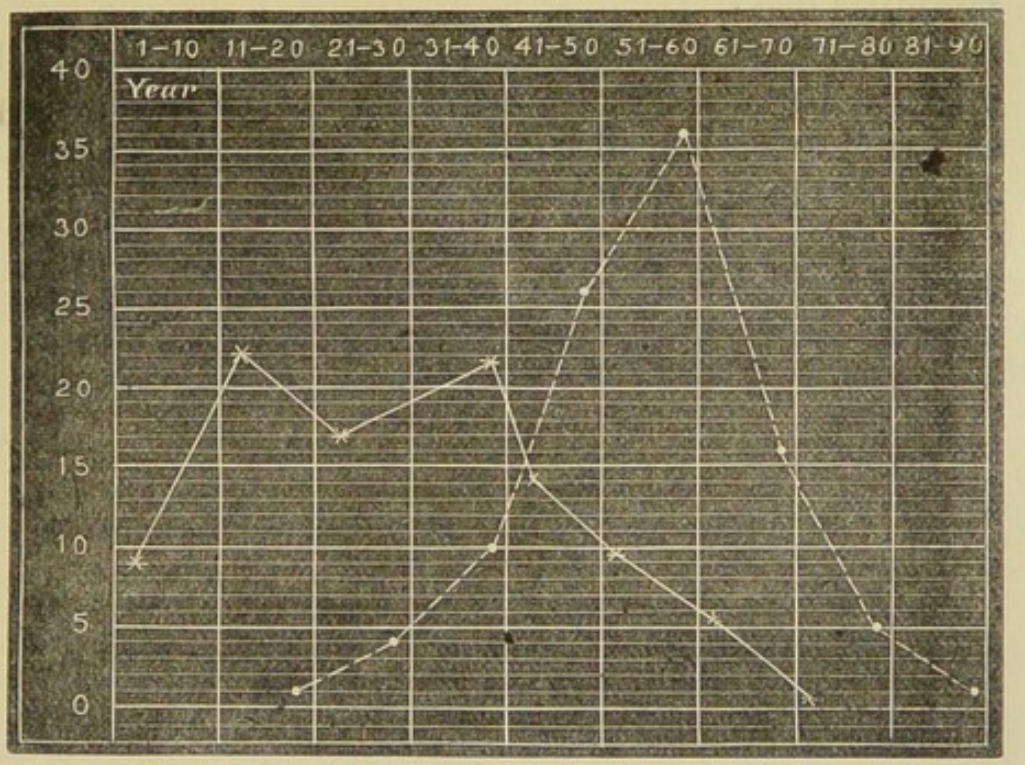
The dotted line – – – illustrates the cases of cancer of the skin and mucous membranes. The plain line —— the cases of sarcoma of the skin, cellular tissue and bones.

sarcoma of the mamma by the side of sarcoma of this organ in an interesting way. We see from this chart that the non-malignant tumours of the mamma begin in the second decennium and that too, in tolerably large numbers. During the third and fourth decennia the numbers keep much the same, and then very rapidly fall. On the other hand, carcinomata are first seen in the third decennium, at which period the number is small; in the fourth and fifth they keep about the same, and then also rapidly fall. The first class of tumours more often developed between the ages of twenty-one and forty, and the second between forty-one and sixty. This proportion is naturally only relative, for it is shown by the other tables that of 296 mammary tumours, 44 were non-malignant and 252 malignant, giving a proportion of 15 : 85. So great a difference might lead one to question the accuracy of the chart,

but I scarcely think that there is any source of error, for the occurrence of these tumours is so characteristic that the proportion would scarcely be found to alter in a larger number of cases.

Following A. von Winiwarter's plan, I have contrasted in the same way (Fig. 26) sarcoma of the cutis, cellular tissue, fascia,

Fig. 26.



The dotted line – – – illustrates the cases of cancer of the breast. The plain line —— the cases of sarcoma of the breast.

and bones, with carcinoma of the cutis and mucous membrane. In this class of cases the sarcomata commence in the first decennium at a tolerably high figure. Between the second and third they fall to some extent, rising again in the fourth to the level of the first, and then slowly falling. Carcinoma commences at a very low level in the second decennium, and rises slowly in the third and fourth, ascends rapidly to a considerable height during the fifth and sixth, does not remain long at this level, but falls almost as quickly during the next two decennia as it previously rose. The rapid fall in the carcinoma curve after the age of sixty does not, as von Winiwarter has pointed out, show that the disposition to cancerous diseases disappears at a later period of life, for it must be remembered that the number of persons living above the age of sixty is comparatively

small. With respect to the etiology of carcinoma, the ascent of the curve alone can possess any accurate signification; it is otherwise with sarcoma. The mortality among the human race by no means increases after the age of forty so rapidly as the curve of the carcinoma sinks. We may well assume, therefore, that the disposition to the formation of sarcoma absolutely decreases after the fortieth year of life. The result of this investigation may be formulated thus:

Irritations, which in individuals previously disposed thereunto, lead to the formation of tumours, tend, during the first three and up to the fourth decennium, principally to the formation of sarcoma, at a later period to that of carcinoma.

CHAPTER XX.

REFERENCES TO STATISTICS, TABLES, ETC.

The references given below relate to the different volumes of the the 'Chir. Klin.' Z. B. stands for the 'Züricher Bericht,' 1860 to 1867. W. B., I, signifies 'Wiener Bericht' for 1868. W. B., II, 'Wiener Bericht' for 1869-70. W. B., III, 'Wiener Bericht' 1871-76. It should be noted that this last volume contains a general statistical survey of the results of sixteen years, from 1860 to 1876.

Chapter III. Septicæmia and Pyæmia.—W. B., II, p. 30; W. B., III, p. 54.

„ IV. Erysipelas.—W. B., II, p. 6; W. B. III, p. 58.

„ VII. Section C, Phosphorus Necrosis.—Z. B., p. 83; W. B., I, p. 29.

„ „ Section F, Cancer of Face, Nose, and Mouth.—Z. B., pp. 120—142; W. B., I, pp. 78—108.

„ VIII. Section B, Glandular Swellings.—Z. B., p. 182.

„ „ Section C, Treatment of Bronchoceles.—W. B., III, p. 213.

„ IX. Periostitis and Caries of the Vertebral Column.—Z. B., pp. 212, 227, 228; W. B., III, p. 224.

„ X. Section B, Mammary Cancer.—Z. B., p. 256—272, 276; W. B., II, p. 146—176.

„ XVI. Section B, Chronic Disease of Shoulder-joint (12 cases). Excision in 3 cases.—Z. B., p. 426; W. B., II, p. 244. (See also p. 368 *supra*.)

„ „ Section B, Chronic Disease of Elbow-joint (40 cases). Excision in 18 cases.—Z. B., p. 430; W. B., II, p. 246; W. B., III, p. 448.

„ „ Section B, Chronic Disease of Wrist-joint (24 cases). Excision in 5 cases.—Z. B., p. 440; W. B., II,

p. 254; W. B., III, p. 459. (See also p. 373 *supra*.)

Chapter XVII. Section A, Fracture of Femur (14 cases).—W. B., II, p. 273.

" " Section A, Chronic Disease of Hip-joint (88 cases). Excison in 7 cases.[1]—Z. B., p. 500; W. B., II, p. 300; W. B., III, pp. 525, 527.

" " Section A, Chronic Disease of Knee-joint (124 cases). Excision in 8 cases.[1]—Z. B., p. 516; W. B., II, p. 314.

" " Section A, Chronic Disease of Ankle-joint and of Bones of Foot (100 cases).—Z. B., pp. 532, 542, 546; W. B., II, p. 346.

It should be noted that in the above references the numbers given only relate to the cases actually tabulated, and do not show the whole number of cases which came under treatment between 1860 and 1876.

Table showing the distribution of tumours in the different regions of the body and the relative frequency of tumours in the two sexes.—W. B., III, p. 634.

Table showing the distribution of tumours in the various tissues of the body.—W. B., III, p. 641.

[1] Operations for excision of the knee- and hip-joints appear to find but little favour in Germany. Professor Billroth himself speaks very disparagingly of the former operation ('Surg. Path. and Therapeut.,' Hackley's translation, p. 488). The different views that obtain in this country may be estimated from an admirable address on "Surgery," by Mr. T. Holmes, delivered before the British Medical Association at Cambridge in 1880, and published in the 'Brit. Med. Journ.' for August of that year.—[Ed.]

APPENDIX I.

CARBOLIC-ACID POISONING.

THE following case of carbolic-acid poisoning after ovariotomy may be added to those already given.[1]

From a woman, æt. 41, I removed a very large fibro-sarcoma of the ovary. She got over the operation well, but a portion of the growth which had been left behind in Douglas's pouch began to increase. Ichorous discharge came from the cut surfaces. All the secretion escaped through an abdominal sinus, which I prevented from closing up by introducing laminaria tents from time to time. So it went on for months. Of the actual ovariotomy the patient could be said to have recovered. I could not make up my mind to operate again on the recurrent growth; all my efforts were directed to prevent decomposition of the surface of the abdominal tumour; I intended then to let the sinus close and discharge the patient as incurable. All the remedies ordinarily employed failed; after repeated dilatation of the sinus I introduced deeply two large drains close to one another, and then injected a considerable quantity of 3 per cent. carbolic acid solution through one of the tubes. The fluid did not completely escape through the other tube, and a quantity, the amount of which it was difficult to estimate exactly, remained in the abdominal cavity. As there was no ill effect from this during the next twenty-four hours, the injection was repeated on the two succeeding days. The urine became of a very dark olive green, but this was such a common occurrence that scarcely any notice was taken of it. On the evening of the third day she was attacked with severe headache, vomiting, and sleeplessness. The carbolic acid was discontinued and replaced by injections of acetate of alum solutions; the headache, restlessness, and vomiting continued. On the seventh day the patient was semi-comatose; the pupils were dilated, but answered tolerably quickly to light; the urine was now normal again, but the cerebral symptoms did not diminish and the drowsiness persisted. On the ninth day she was attacked with repeated epileptiform seizures (unfortunately not detailed in the records of the case) of short duration. Death on the tenth day. Post mortem: "The dura mater, like the cerebral membranes generally and the brain itself, very pale; the convolutions much flattened, and the brain substance wet and softer than natural; the ventricles dilated

[1] The case is given in the 'Wien. Ber.,' for 1860-76, in the chapter on "Carbolic Acid Poisoning."

and full of clear serum; the brain tissue in the neighbourhood of the right lenticular ganglion and the parts immediately around tinged with a yellow pigment, the nature of which could not be determined. In the bronchial tubes abundant frothy mucus. Both lungs highly œdematous and anæmic. Heart natural size, slightly contracted; in its cavity some purulent exudation. The visceral and parietal pericardium injected and covered with a tough layer of fibrinous exudation. The abdominal organs adherent to each other in great part by stringy and membranous connective tissue. Both kidneys pale. The liver, spleen, and intestinal canal anæmic."[1]

Such information as I have been able to gather on the subject of carbolic-acid poisoning strengthens the suggestion made by Professor Billroth that the simple difference of nationality may account for the greater frequency of severe cases observed by him. At the same time I suspect that the susceptibility to the toxic action of carbolic acid does not vary so much as might appear at first sight. There seems to be a general consensus of opinion that children and weakly women are more liable to the effects of the drug than others. Through the kindness of my friend, Mr. J. A. Kempe, late house-surgeon at the Hospital for Sick Children in Great Ormond Street, I learn that among the patients there mild cases were moderately frequent, but the symptoms rarely went beyond dark urine, vomiting, and elevation of temperature. Mr. Kempe ascribed this at one time to the crude quality of the carbolic acid employed, and found that with a purer description the cases were at any rate far less frequent. The symptoms subsided always readily on the discontinuance of the carbolic acid. It was noticed in several cases that urine which at first showed no trace of the characteristic tinge became dark after standing for some hours.[2] Again, Mr. Spencer Wells, in a paper read before the Royal Medical and Chirurgical Society,[3] stated that he had never known injurious effects from carbolic acid in any of his cases of ovariotomy. I have seen dark urine, associated perhaps, with slight nausea and some elevation of temperature, after ovariotomy, but not proportionately more frequently than after other operations. Here, again, the symptoms always readily subsided after the carbolic acid had been replaced by other substances. Carbolic eczema is more common and, so far as I have been able to learn, the carbolic antiseptic dressings are abandoned or changed for

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[1] Another case of carbolic poisoning after ovariotomy will be found *supra*, p. 15.

[2] See a paper by Mr. Thomas Smith in the 'St. Bart. Hosp. Rep.,' vol. xiv, 1878, p. 137. Mr. Smith notes also (p. 144) the great susceptibility of children to the toxic influence of the acid, but does not mention any fatal case.

[3] A very brief abstract of the paper will be found in the 'Med. Chir. Proc.,' vol. ix, No. 1, p. 31. See also on the same subject the reports of two very animated discussions at the Royal Medical and Chirurgical Society in the 'Lancet,' December 18th, 1880, vol. ii, No 25, p. 976, and January 15th, 1881, vol. i, No. 3, p. 101.

others far more often on this ground than for carboluria or vomiting. Phenol may produce carboluria or eczema as well as the ordinary carbolic acid, but it is less apt to do so.

One other circumstance may partly account for the severity of the cases reported from the Continent. German surgeons believe little in "shock," and after antiseptic amputations, for instance, are disposed to ascribe to the effects of the carbolic acid deaths which surgeons in this country would set down usually to the former cause.[1] Without entering into any discussion on the point, it may be noted, if this view be accurate and "shock" a condition which should not be recognised, then we should expect to find fewer deaths recorded after grave operations previous to the introduction of carbolic acid. Such, however, judging from the tables of amputations, etc., given above, I do not find to be the case. The term "shock" as a cause of death may be vague and general, but it affords at least as good an explanation as one which, though definite, is of doubtful accuracy in all the cases for which it is held accountable.

At a recent meeting of the Clinical Society,[2] Mr. Lister adverted to the great susceptibility of some patients to carbolic acid, and stated that the oil of Eucalyptus globulus, if used properly, was a powerful, reliable, and unirritating antiseptic.

Neither in Küster's excellent essay, already referred, to, nor in other works on the subject, can any very satisfactory explanation be found of the chemical action of carbolic acid on the urine.

Through the kindness of Dr. Johann Mikulicz, I learn that in Professor Billroth's clinic cases of carbolic-acid poisoning and eczema are now of rare occurrence, nor have any further deaths taken place from the former cause. Carboluria still not uncommonly follows ovariotomy where carbolic acid has been used, but has not interfered with the success of the operations.[3] [Ed.]

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[1] Some remarks on this point will be found in Langenbeck's 'Arch.,' xxiii, p. 149, in the course of a paper by Dr. Ernst Küster, entitled "Die giftigen Eigenschaften der Carbolsaüre bei Chirurgischer Verwendung." The essay contains numerous references to the literature of the subject. See also Mr. Savory's article "Collapse," 'Holmes's Syst. of Surg.,' vol. i, p. 768, 2nd ed., which affords an interesting comparison.

[2] Reported in the 'Lancet,' May 21st, 1881, No. 21, vol. i.

[3] See note at end of Chapter XIV, p. 318, and also Preface.

APPENDIX II.

ACUTE PERIOSTITIS AND OSTEOMYELITIS.

Professor Billroth's views on the pathology of acute periostitis and osteomyelitis can best be gathered from his 'Surgical Pathology,'[1] and differ in some respects from those held by writers in this country: the morbid anatomy of the former affection is, for instance, very differently described by Billroth[2] and Holmes.[3] Again, it would seem that osteomyelitis, as an idiopathic affection, is not uncommon in Germany and Austria. A comparison of the views of other writers, such as Chassaignac, Verneuil, Crampton, Gerdy, Rognetta, Sir A. Cooper, and others, show that opinions are tolerably divided on the questions. Cornil and Ranvier,[4] in a very brief essay on the subject, probably hit the truth when they describe the affection as liable to commence above or beneath the periosteum or in the bone itself, from which description it is easy to see that these inflammations are at the outset hard to distinguish apart, and are apt to run one into the other. To those who are interested in these questions, I may venture to refer to a paper on the subject, an abstract of which will be found in the 'Lancet,' No. 25, vol. i, 1881[5]. [Ed.]

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[1] 'Surgical Path. and Therapeutics,' Hackley's trans., pp. 289, 448.

[2] Op. cit., p. 293.

[3] 'Syst. of Surgery,' vol. iii, p. 741, 2nd ed.

[4] 'Manuel d'Histologie Pathologique,' 2nd ed., vol. i, p. 399 (Paris, 1881).

[5] See also 'Proc. Med. Chir. Soc.,' vol. ix, No. 2, and 'Trans. Med. Chir. Soc.,' vol. lxiv, 1881.

APPENDIX III.

ON THE REMOVAL OF THE PYLORUS FOR CANCER.

[THE essay, of which the following is a condensed translation, is the work of Dr. Anton Wölfler. It describes and relates four cases of removal of part of the stomach and pylorus, three of which were performed by Professor Billroth and one by Dr. Wölfler himself. From want of space, the essay has been necessarily very much abridged, nearly all the historical introduction and numerous references being omitted. The full title of the pamphlet is 'Ueber die von Herrn Professor Billroth Ausgeführten Resectionen des Carcinomatösen Pylorus,' Vienna, 1881.—ED.]

In August, 1877, Billroth concluded a paper on a successful case of gasteroraphy, with a remark to the effect that it would now be but a short step to an operation for removal of cancer of the stomach. Again, two years later, in speaking of a case of enteroraphy, he pointed out that there was no insuperable obstacle to partial resection of the stomach either on anatomical, physiological, or operative grounds; "it must succeed."

Gussenbauer and v. Winiwarter were the first to show by experiments on animals that the physiological objections were not insuperable. In the case of a dog experimented on by Czerny and Kaiser,[1] the animal not only lived a long time after removal of the entire stomach, but the weight of the body increased one half in the course of eight months. It is an interesting fact that gasteroraphy was performed by a Bavarian surgeon, in 1521.[2] The first surgeon actually to perform resection of the pylorus was Péan, who operated on April 5th, 1879. The patient died in five days.[3]

[1] Kaiser: 'Beiträge zu den Operationen am Magen.' Czerny's 'Beiträgen zur Operativen Chirurgie.' Stuttgart, 1878.

[2] As learned from a rare pamphlet, entitled 'Wunderberliche czaychen vergangen Jars beschehen in Regenspurg tzw der schönen Maria der mueter gottes hye in begriffen.' Regenspurg, 1522.

[3] 'Gazette des Hôpitaux,' No. 60, 1879.

The second operation was performed by Rydygier,[1] who, on the 16th November, 1880, removed a cancer of the pylorus from a man æt. 64. The patient died twelve hours after the operation.[2]

The anatomy of the stomach and gastric cancer.

The position of the stomach will be found to vary so much in different subjects that no decided rule can be laid down as to the incision which will lead down most directly to the pylorus. This part, when cancerous, constantly shifts its position. Rokitansky knew of cases in which the pylorus had sunk down by its weight as far as the symphysis pubis, and Billroth remembered a case where a cancerous pylorus was found close above Poupart's ligament, on the right side. To find it beneath, or to the right or left of the umbilicus, is by no means uncommon. Not only the weight of the diseased part, but the adhesions also which it contracts with the neighbouring organs, conduce to alter its position. The vessels with which the operator is chiefly concerned are, the pyloric branch of the hepatic artery, and the gastro-epiploica dextra; the latter vessel is easily separable from its loose connections with the greater curvature. The veins run parallel with their arteries.

From three to five lymphatic glands are usually found in the lesser omentum, and from four to seven on the greater curvature.

Gussenbauer and v. Winiwarter have shown that the pylorus is a favourite seat of cancer, and that the affection attacks the neighbouring organs comparatively late. Among 903 cases of gastric cancer, the disease started in 542 in the pylorus. Among these, it was found at the post-mortem examination that in 223 there were no cancerous nodules. Still more important is the fact that in 172 instances there were no adhesions to the neighbouring organs. Of especial interest, with regard to resection of the pylorus, is the fact observed by Rokitansky that cancer of the pylorus scarcely ever extends down the duodenum.

[1] 'Przegląd Lekarski,' No. 50, 1880.

[2] It appears that about two years ago Guido Cavazzani, of Castelfranco, while extirpating a tumour of the abdominal walls, successfully excised a portion of the anterior wall of the stomach. Further details will be found in the 'Gazetta Medica Italiana, Provincie Venete,' 22nd March, 1879, No. 12, p. 99.

Preparatory treatment before operation.

It is easy enough to decide that a case is suitable for operation when the cancer of the pylorus is freely movable, but it is very difficult to give an opinion when the carcinoma is partly fixed. The fact that only a part of the stomach is accessible to palpation, and that the organ is held in place by numerous peritoneal connections, often make it difficult to say whether the mobility is that of the entire viscus or of the tumour alone. Again, the cancer may be movable to some extent, owing to its being adherent to neighbouring organs, such as the colon, or even the liver, which themselves are not firmly fixed. Indeed, one of our cases showed that a certain amount of mobility may be present when the cancer is connected to the pancreas. Icterus, when the cancer is movable, might be due to accidental catarrhal affection, but when this symptom is present we should generally suspect hepatic cancer, or pressure on the gall-duct by extension of the cancer on to the pancreas or into the neighbouring lymphatic glands.

Judging from our second case, adhesions of the cancer to the abdominal walls do not seem to absolutely contraindicate operation, unless of course the patient be highly marasmic, or the tumour very large. We need not be deterred from operating even by very marked emaciation, for gastric cancer unfortunately consumes the strength with great rapidity, and thus the patients are rarely strong when they come under observation. In order to estimate the extent of the cancer and the degree of mobility, it is always better to examine under an anæsthetic. Considerable difficulty will be experienced when the pyloric cancer is associated with dilatation of the stomach. Dilatation in our second case was the principal reason for the fatal issue. It will always be well, therefore, to estimate the dimensions of the stomach when it is distended artificially with carbonic acid gas by the administration of bitartrate of potash and carbonate of soda. One of the cases (No. 1) shows well that the pyloric sphincter is not absolutely necessary for the function of the stomach after resection; but it may be otherwise when the resection has been performed upon a dilated stomach. When the stomach is able to contract well, the office of the sphincter pylori can be replaced in great measure by the muscular coats of the stomach, which may be able to prevent regurgitation of

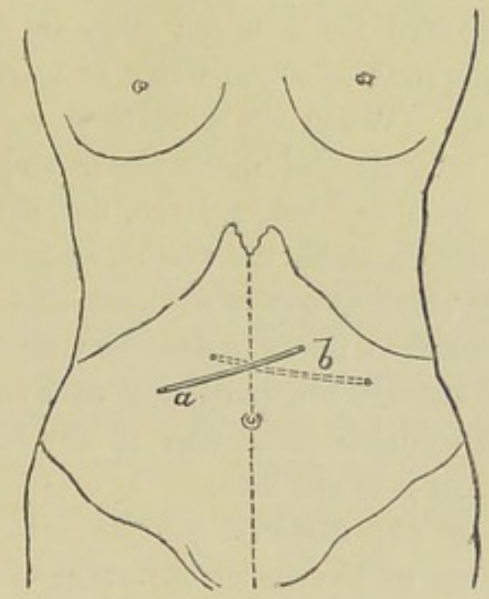
the intestinal contents or, at the least, to empty the gastric contents quickly and completely into the duodenum.

Our second case showed distinctly that nutrition is gravely interfered with when the stomach is greatly dilated, from the insufficiency of its muscular power. We may hope that further observations will show that when proper precautions are taken, dilatation of the stomach does not absolutely contra-indicate removal of the pylorus, for the condition will seldom be absent in pyloric stenosis. If examination under an anæsthetic, etc., have not enabled us to make out with certainty the extent of the cancer, we can always resort to an exploratory incision as a simple and usually safe help to the diagnosis. If it be decided to operate, particular attention should be paid beforehand to the kind of food that the patient tolerates best. Our first patient took nothing but sour milk before the operation, and for two weeks after it the same food was found best and most agreeable for her. Further, for several days previously, and again two hours before the operation, the stomach must be thoroughly washed out with tepid water. This process is perhaps the most disagreeable part of all the preparatory treatment for the patients, but they soon become accustomed to it if only the œsophagus tube is introduced often enough. Finally, the precautions necessary for laparotomies generally must be observed, such as emptying the bowels, clothing the extremities with warm flannel, raising the temperature of the room to 20° C., etc.

Details of the operation.—(1.) An incision should be made through the abdominal walls over the situation of the tumour. If the cancerous pylorus has sunk down particularly low, it should be raised up before the incision is made. The lines *a*, *b*, Fig. 27 show the incisions adopted in our cases. They were from four to five inches in extent. A transverse incision was, on many grounds, found more convenient than a vertical one, as practised by Péan and Rydygier. All bleeding having been stopped, the peritoneum should be opened and the extent and nature of the adhesions to the surrounding parts (transverse colon and pancreas, etc.) made out. If the cancer should be adherent to the pancreas, Billroth advises, at present, that the operation should not be further proceeded with. Complete removal would render it necessary to place a ligature on some part of the pancreas. This appears undesirable on two grounds; first, we know that after ligature of the parotid great swelling and numerous

small abscesses not infrequently form, leading to necrosis of portions of the gland; secondly, there is some fear that the secretion escaping from the pancreas may dissolve the cicatrix of the stomach by its peptonising properties.

FIG. 27.



If the cancer is so united to the transverse colon that there would be risk of recurrence if the two were merely separated, we might think of resecting the transverse colon also, but this would be a fatal complication, and greatly protract the operation. If the cancer has extended over the horizontal part of the duodenum, or up to the ductus choledochus—which is very rarely the case—the operation must be discontinued.

(2.) *Isolation of the pylorus.*—As soon as the condition of the parts has been made out, the stomach is drawn up to the wound, and examined to see the point at which it must be cut through; we then know how far we must proceed in detaching the normal and pathological adhesions. Now follows under some circumstances the most difficult part of the operation, viz. the complete isolation of the pylorus and the portion of the stomach and duodenum immediately adjoining. To begin with, the large omentum is detached from the greater curvature, and the gastro-colic ligament cut through. The layers of the omentum are taken up in small portions between two clip forceps, which form grooves just suitable for the application of silk ligatures. The tissue is cut through in the middle between the ligatures or, still better, burnt through with the thermo-cautery.

This is not, however, always necessary, for by means of blunt forceps the great omentum may be detached without any hæmorrhage; the lesser omentum is then separated in the same way. In detaching the omentum enlarged lymphatic glands may be met with requiring removal. During the entire operation the portion of the stomach which it is intended to replace must be covered by cloths which have been soaked for fourteen days in 5 per cent. carbolic solution, and wrung out of warm water or warm thymol solution before the operation. When the part to be resected is completely exposed the most difficult and disagreeable steps are over. After the stomach has been isolated, a large, flat, disinfected sponge or cloth should be laid beneath the viscus, so that the further manipulations may be carried out with ease and care. By gently lifting out the stomach as far as is necessary all further proceedings may be conducted outside the peritoneal cavity. The sponge and cloth will prove a valuable protection if any contents left in the stomach escape when it is cut into.

(3.) *Resection of the diseased portion.*—If it is intended to attach the duodenum to the lesser curvature of the stomach, as in our first two cases (see Plate III, figs. 2 and 5), the incisions are best made as shown in Plate III, figs. 1 and 3. The tumour being seized with the vulsellum, the walls of the stomach are cut through with scissors, commencing at the greater curvature. After each stroke of the scissors any bleeding points are secured; about two thirds must be divided. If it be found that the stomach is not completely empty, the contents should be soaked up with a sponge specially reserved for this purpose. All vessels are now ligatured with fine antiseptic silk, and the cut edges of the stomach so united together that the serous coats are applied to each other. Billroth applies superficial sutures where necessary, in addition to intestinal sutures. The knotted threads are left hanging for the time (Plate III, fig. 3, and fig. 4 N), so as to hold the stomach. The cancerous pylorus is now connected to the intestine alone. Fig. 4 shows the manner in which the division is commenced in order to separate it from the horizontal part of the duodenum. If there is any fear lest the portion of duodenum should slip away when the division is completed, a few silk threads may be passed, as shown in fig. 4 L. If they are required it will be found better to pass them through the anterior wall of the gut. A small sponge may be inserted temporarily into the duodenum.

(4.) *The insertion of the duodenum into the stomach.*—As with the intestine, so here also, we must begin at the posterior walls of the stomach and duodenum. A very good plan of uniting them is to insert the posterior sutures before the duodenum is completely separated. In our first case the entire stomach was cut through, and then the upper half of the duodenum. Several threads were then carried through the walls of the stomach and duodenum to form the posterior "ring suture," and were then given to an assistant to hold while the occlusion sutures were being inserted; it was found, however, that the sutures cut their way a little through the thin wall of the duodenum, and that the punctures made by the needle enlarged. In the second case the gut was partly divided, enough being left to hold up the duodenum while the sutures were applied at the back. The disadvantage of this method is that the posterior wall of the duodenum has to be twisted if the operator wishes to make sure of applying these very important sutures with precision. It is far more convenient to apply the posterior "ring sutures" from within, as shown in Plate III, figs. 10 and 11, which were drawn from a preparation made from the dead subject. The needle should be inserted between the mucous and muscular coats, carried through between the muscular and the serous, then through the same layers of the duodenum, and finally brought out between these layers and the mucous membrane at the cut edges. These "inner intestinal sutures" resemble Czerny's modification of Lembert's suture. At my own suggestion first, they were inserted from within outwards, in order to bring a considerable breath of the serous coats into apposition; the needle should pierce these layers about a centimètre from the cut edges. The edges of the mucous membrane fall naturally into apposition, for, owing to the strong retraction of the muscular coat, the mucous lining always projects a little. If at any point this is not the case, a very fine suture can be carried through the mucous membrane, and the threads cut off quite short (Plate III, fig. 11). The knots of the inner intestinal sutures will thus obviously fall inwards. In this way the posterior walls of the stomach and duodenum are united; the sutures are now inserted on the anterior surfaces in the ordinary way. It is well to put in a few additional superficial sutures at the point marked "M" in fig. 5. As we know that the ordinary Lembert's knot, such as has been described, brings the inner surfaces into good apposition, it might seem superfluous to put in additional

sutures to unite the cut surfaces of the mucous membrane; still, I think it is as well to insert at least two or three, and thus to make sure that every part of the cut surface is covered over. This is of importance, for the gastric juice might attack the wounded surface if it were exposed. If it be desired to unite the mucous membrane on the anterior wall, the threads must be inserted from the outside before the Lembert's sutures are passed through the serous coat. Gussenbauer and Czerny have already insisted on the importance of uniting, not only the serous surfaces, but also the edges of the wound.

FIG. 28.—GUSSENBAUER'S INTESTINAL SUTURE.

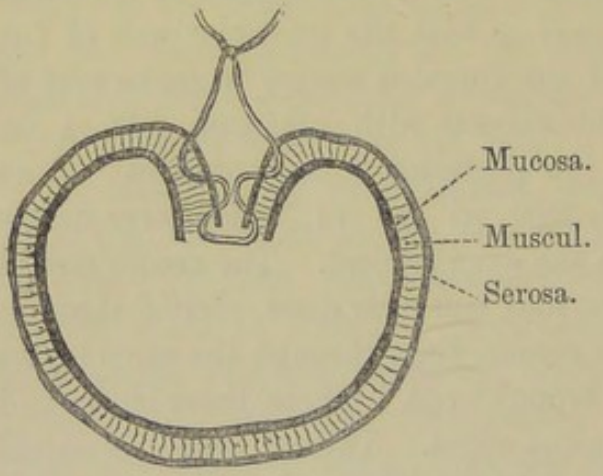
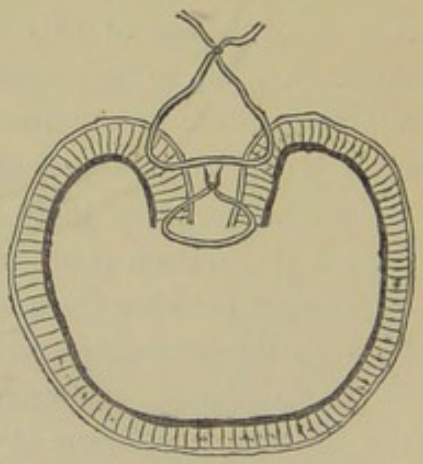


FIG. 29.—CZERNY'S INTESTINAL SUTURE.



When all the sutures have been inserted and finally inspected, a sponge soaked in weak carbolic lotion is laid on the anterior surface of the stomach, and the abdominal walls are united in the ordinary way with lead button sutures, with a few ordinary sutures between them. When all the sutures had been inserted in the first case, we were not a little astonished at the excellent shape of the new-formed stomach (see Plate III, fig. 2), which was almost normal in appearance. The greater and lesser curvatures alone were somewhat flattened. In our second case, therefore, we saw no reason to alter the plan of attaching the duodenum to the lesser curvature. In consequence, however, of the immense dilatation of the stomach in this case, and the greater extent of the cancer, which rendered it necessary to modify the direction in which the duodenum was divided, a diverticulum formed (Plate III, fig. 5 D), as will be described presently. Profiting by this experience the following plan was adopted in the third case:—The duodenum was attached to the

greater curvature of the stomach, in order to guard against the formation of a diverticulum, and to provide for the more ready passage of the gastric contents. Unfortunately, the patient, who was in a very reduced state, died twelve hours after the operation. This was the most complete of all Professor Billroth's three resections. Figs. 6 and 7, Plate III, show the direction of the incisions, and the resulting form of the resected stomach.

The only modifications necessary if the duodenum be united to the greater curvature of the stomach are, that the separation should be commenced at the lesser curvature; the occlusion sutures (N, Plate III, fig. 4) should be inserted at once as before, and the rest of the operation conducted as shown in Plate III, fig. 4. If there is any fear lest a diverticulum should be formed at the lesser curvature, it would be as well to carry the incision obliquely through the walls of the stomach, as shown in fig. 6, provided the extent of the cancer permitted it. Under some circumstances, we might find ourselves compelled to insert the duodenum midway between the greater and lesser curvature, as shown in figs. 8 and 9, which illustrate the necessary incisions, and the resulting shape of the stomach.

Under all conditions it is desirable to divide the stomach obliquely, in order to prevent the formation of diverticula. In future cases Professor Billroth intends, whenever possible, to attach the duodenum to the greater curvature. In none of our cases did a single drop of the contents of the stomach or duodenum escape into the peritoneal cavity, although we used no special contrivance to occlude temporarily either end of the canal. The elastic compressorium employed by Rydygier seems to me not only superfluous, but injurious.[1]

With regard to the method of sewing up the stomach, I think the main point is to avoid any folds; this will be accomplished by carrying the incision obliquely through the viscus, so that more is cut away from the part where the occlusion sutures are to be inserted than from the other side. Secondly, the lumen of the stomach should be so far closed by means of Lembert's sutures that the opening left is no larger than that of the duodenum.

The after-treatment is simple enough when matters progress favourably. In Case 1 the dressings were first changed and the sutures in the abdominal wall removed on the sixth day.

Although the second and third cases ended fatally, no general

[1] On this point see Gussenbauer, 'Arch. f. Kl. Chirurg.,' Bd. xix, p. 350.

peritonitis was set up in these or any of the patients. The second patient died of inanition the result of the mechanical obstruction, and the third of collapse. The diet after the operation is a point of great importance in the after-treatment. Sometimes, nay usually, the patients are in great need of nourishment and will not long tolerate the simple administration of ice. To the first patient, a feeble woman, Professor Billroth did not hesitate to give a tablespoonful of cold sour milk every hour the day after operation; this was exceptionally well borne. During the following days, larger quantities were given, so that by the eighth day the patient took a litre or more of milk in the twenty-four hours; subsequently up to the fourteenth day she had some tea and cocoa boiled in milk, wine, and wine-soup, and at the end of a fortnight she was able to take meat. At the outset we had great hopes that we should be able to carry the patients through the first few days by means of nutrient enemata, but neither peptone or pancreatic injections were tolerated; they generally set up diarrhœa, which reduced the patients very much. We were thus limited to injections containing wine, which at first were given every third hour, directly after the operation and during the next few days, and answered well. Further details will be given in the descriptions of the cases.

Case 1.—Therese Heller, æt. 43, was admitted on the 25th January, 1881. The patient had suffered for three months from symptoms of indigestion. Every day, about half an hour or an hour after her meals, she brought up the greater part of what she had taken. There was no blood in the vomit but the stools were usually tarry. For some time previous to admission she had been able to take nothing but sour milk. She had wasted much and lost strength, was very anæmic, and for the last six weeks had been forced to keep her bed. The skin and mucous membranes generally were pale, the tongue furred, the pulse thready, the abdominal walls flaccid. In the umbilical region could be felt a hard, easily movable tumour, painful on pressure, and about the size of a small fist. It was unconnected with the abdominal walls. On the left side of the growth the limits of the stomach could be distinctly made out by percussion. Other organs normal. Taking into account the weak state of the patient, operation could not long be postponed.

The evening before the operation enemata were administered, and an hour before the stomach was washed out. We introduced into the stomach a moderately large drainage tube, to the upper end of which a glass funnel was connected. Through this about a litre or a litre and a half of lukewarm water was poured in; as the funnel was depressed the fluid escaped again, the tube acting as a syphon. This proceeding was repeated several times, until the water escaping from the stomach was perfectly clear. About four-

teen litres of water were employed to wash out the organ. The temperature of the operating room was kept at 20° C. The operation was performed on the 29th January, 1881. An incision, eleven centimètres long, was carried from right to left over the tumour, above the umbilicus (p. 497, fig. 27, A). On dividing the peritoneum the tumour was found to occupy the pyloric region and the adjoining part of the anterior and posterior walls of the stomach. It proved to be larger than the examination had led us to suspect. The growth was now drawn somewhat forward through the abdominal incision. By means of a cloth, prolapse of the intestines was readily prevented. Double ligatures were carried through separate small portions of the lesser omentum, which was then divided between the ligatures, above its connection with the tumour. Five fine silk ligatures were left on the small, and six on the great omentum, which was divided in the same way. The great omentum and the transverse colon were adherent to the greater curvature and thickened. A lymphatic gland, the size of a hazel nut, and two small nodules, which felt hard, were removed, together with the altered gastro-colic ligament. Any parts which to the eye or the touch gave suspicion of cancerous changes were removed, but it was quite possible that in the portion of the omentum which was connected to the transverse colon some microscopic nodules were left behind. The pyloric end of the stomach was in this way completely isolated; cloths were laid behind the stomach, and the wound in the abdominal walls was protected by sponges from any escape of the gastric contents. The duodenum was now cut into from above, and the stomach obliquely divided, as shown in Plate III, fig. 1. Nothing escaped from the stomach, which was completely empty. The temporary sutures were now inserted in the lesser curvature and the corresponding part of the duodenum, as shown in fig. 1, L. Next, the stomach and the duodenum were completely cut through and the pyloric tumour removed. Four vessels on the stomach required ligature. The lumen of the stomach was partly closed from below upwards with twenty-one sutures, some deep, some superficial. The union of the opening left at the lesser curvature of the stomach with the duodenum was completed by means of thirty-three silk sutures. All the sutures were cut short and left in the cavity of the abdomen. As already mentioned, the wall of the duodenum could not stand the strain exercised on it by the temporary sutures, and the punctures became enlarged to the size of a lentil, rendering more superficial sutures necessary. The stomach was now returned into the abdominal cavity, its surface having been sponged over with a 2 per cent. solution of carbolic acid. Finally the abdominal wound was closed.

No drainage tubes were inserted, nor was the spray employed during the operation. Carbolic dressings were applied. The operation lasted one hour and a half. The size and shape of the tumour can be gathered from Plates I and II. The part removed measured 14 centimètres ($5\frac{1}{2}$ inches) along the lower, and 10 centimètres (4 inches) along the upper border. The incisions had been carried 2 centimètres beyond the limits of the disease on either side. The pyloric opening was so narrowed that a probe

could with difficulty be passed through. Microscopical examination showed the tumour to be an alveolar colloid cancer, and a similar morbid growth was found in the lymphatic glands.

The progress of the case was favourable. On the second, tenth, and twelfth days the temperature rose to 39° C., and during the intervals it varied between 37° and 38·4° C. On the fifteenth day it was normal. With the exception of a feeling of weight during the first twenty-four hours, the patient had no particular subjective sensations. The abdomen kept flaccid, there was no vomiting, and from the very first flatus passed abundantly. During the first day the patient had nothing but ice, on the second day acid milk (a coffee-spoonful every hour), subsequently sweetened milk, and then gradually coffee, cocoa, tea, port wine, eggs, biscuits, and "schinken." On the twentieth day after the operation, our patient was able to eat a cutlet with the best of appetite, and on the following day a beef-steak.

As I have already mentioned, neither the peptone nor the pancreatic injections were tolerated. It was found that they caused flatulence and colic. Wine enemata were persevered in with advantage up to the thirteenth day.

During the first twelve days the state of the bowels gave rise to some anxiety. Although the patient ate comparatively little, still large quantities of fæces were passed, but so hard were they that the nurse had sometimes to scoop them out with her fingers. The motions were so white and chalk-like that we feared that the functions of the bile were not properly discharged. As soon, however, as the patient began to take solid food, the stools (at the end of the second week) again became of a brown colour and the fæcal masses diminished in size, a proof that the peptonising functions of the stomach had recommenced.

The abdominal incision was completely healed by the eighth day.

A few days later an infiltration, which scarcely gave any pain, could be felt beneath the cicatrix, but this had almost disappeared when the patient was discharged at her special request on the 20th February. The further treatment of the case was carried on by Drs. Mikulicz and Ehrendorfer. On the 10th April (seven weeks after her discharge) I heard that her condition was very satisfactory; her nutrition was distinctly improved, she could take any kind of food, the bowels acted normally, and she was able to be about all day.

(Through the kindness of Dr. Wölfler I learnt that this patient died of exhaustion on the 24th May, 1881, nearly four months after the operation. To within a fortnight of her death scarcely any symptoms of indigestion were noticed. The post-mortem examination revealed cancerous degeneration of the peritoneum and infiltration of the retro-peritoneal lymphatic glands. The form of the stomach was similar to that of the normal organ. Further information about the case will be found in the 'Wien. Med. Woch.' for 28th May, 1881, No. 22, p. 634.—Ed.)

Case 2.—Johanna Schönstein, æt. 39, was admitted on the 24th February, 1881. For some months she had suffered from indigestion, loss of appetite, sense of weight in the gastric region after taking solid food, and heartburn. Two months before admission she had some circumscribed peritonitis about the gastric region and some induration was noticed under the ribs on the left side. For some weeks she had only been able to take soup, milk, and coffee. The bowels acted once only in six or eight days, and the stools were tarry. The patient had never vomited.

When first seen she was very much emaciated and anæmic, having lost ground very much for some time immediately preceding admission. She readily agreed to any operation which gave her a chance of relief from her sufferings. The carcinoma of the stomach seemed to be about the breadth of the palm of the hand, hard, painful on pressure, and tolerably movable. It was situated on the left side, between the umbilicus and the arch of the ribs. The growth evidently had no connection with the liver, but it seemed to be adherent to the abdominal wall. The tongue was rather coated, the pulse small, the temperature normal. The favourable experience of the first case, the youth of the patient, and the fact that the tumour was movable, decided Professor Billroth to operate, or at the least to make a diagnostic incision. The preparatory treatment was the same as in the former case. The operation was modified in the following particulars:—The stomach and the duodenum were not cut through until the occlusion (Plate III, fig. 4 N) as well as the fixation sutures had been inserted. The operation was performed on the 28th February, 1881. A transverse incision, twelve centimètres (four and three quarter inches) in length, was made over the tumour. The growth appeared to be united to the transversalis fascia, a portion of which and of the adherent abdominal wall were left attached to the tumour. The growth was found to invade the pyloric region of the stomach; as this was drawn forwards the patient vomited up about half a litre of fluid which had been employed to wash out the stomach. The great and small omenta were then secured with seven and four ligatures respectively. In ligaturing the former, the right gastro-epiploic artery had to be tied. The stomach was now half cut through with the scissors, beginning at the greater curvature. The pylorus was isolated, and sponges and cloths laid behind it. The stomach contained also some undigested remnants of food. The cavity was washed out with lukewarm water and its walls cleansed with disinfected sponges. It was then found that the viscus was exceptionally dilated towards the diaphragm and the left ribs, so that with the longest sponge forceps I could not reach the end. Before the complete division of the stomach twenty-eight deep and

superficial occlusion sutures were applied (Plate III, fig. 3 N); then the organ being completely divided through its lesser curvature, the lumen 'A' (Plate III, fig. 4), was left; the duodenum was next partly cut through, and the Lembert's sutures (L, L, L) inserted; the duodenum was now completely severed, and the tumour removed. The other "ring sutures" were inserted and the threads (L) tied; no difficulty was found in drawing the stomach over to the duodenum. The total number of sutures inserted was fifty-eight.

As shown in Plate III, fig. 5, a diverticulum (D) formed at the greater curvature. There was no doubt that it was principally due to the fact that the stomach and the duodenum had been cut through in a vertical direction. The abdominal wound was closed and antiseptic dressings applied. No drainage tubes; no spray during the operation, which lasted two hours and three quarters. The excised portion measured ten centimètres along the greater, five centimètres along the smaller curvature, and six centimètres in breadth. The pylorus was filled up by a cancerous mass, its opening just admitting the tip of the finger. The growth was ulcerated on its surface, and proved to be an epithelial cancer.

The patient died of inanition, with symptoms of great anæmia, on the eighth day after the operation. The morning after the operation she vomited 300 grammes of brownish fluid. In the evening, after taking a little milk, retching set in at once. The third day she was better and had taken some milk, etc., but on the fourth day, after taking a little milk, bilious vomiting began. During all this time there was no distension; flatus passed, the wound looked well, and the temperature was normal, but the pulse varied between 112 and 120. It was clear that the dilatation of the stomach was the essential cause of the vomiting. Evidently the gastric contents did not flow into the duodenum, and evidently also there was no complete stenosis where the "ring sutures" were applied, for bile was present in the vomit. Suspecting that a quantity of fluid might have collected in the flaccid sac of the stomach, we drew off the contents and evacuated about 200 grammes of yellowish, sour fluid. Attempts were made to restore the functions by the administration of good wine and meat, but all in vain; the greater part was thrown up again in a few hours. By the next day we were restricted to giving nutrient enemata. Thinking that a diverticulum might have been left in the stomach, and that some obstruction must exist which had not been present before the operation, for the patient had never previously vomited and had always been able to take fluid food, Professor Billroth adopted the last resource which the circumstances seemed to indicate. The wound was reopened and the occlusion sutures cut. The index finger passed into the stomach could only with difficulty be introduced into the duodenum. The anterior "ring sutures" were also divided and the wall of the duodenum attached to the abdominal walls, a drainage tube being passed into the gut

for the administration of food. The patient was very pale and collapsed after this operation, which lasted an hour. She died on the following day.

The post mortem, as we expected, showed no general peritonitis, but only general anæmia and marasmus.

On reviewing the case of Frau Schönstein we may note that the post mortem proved that the cancer had been completely removed, and that no trace of peritonitis existed. The cause of death was chiefly due to the great dilatation of the stomach; numerous other unfavourable circumstances were added which rendered the point of junction of the stomach and duodenum impermeable. The horizontal part of the duodeuum near the lesser curvature was attached to the cicatrix, while the large sac of the stomach was situated at the lower and back part. Thus a sharp bend must have undoubtedly been caused similar to those which Kussmaul has shown to be present in cases of dilatation of the stomach. In addition to this, the duodenum in our case was attached to the thickened edge on the lesser curvature, and thus the lumen, where the "ring sutures" were inserted, was converted into a slit, through which the atonic muscular coats of the stomach were unable to drive the gastric contents. The peristaltic movements of the stomach became reversed and vomiting set in. The importance of dilatation of the stomach as a complication was well shown by this case.

Case 3.—Franziska Heininger, single, was admitted 8th March, 1881. She had suffered from gastric troubles and daily vomiting for about a year. Since October, 1880, she had only been able to take fluid food, and since the same date a tumour had been noticed and she had suffered marked pain in the gastric region. When admitted she did, however, take solid food without vomiting, but complained of heartburn. She frequently went eight days without any action of the bowels. The patient had become greatly emaciated during the few months previous to admission. When first seen she was very anæmic and wasted; the mucous membranes were pale, the skin dry, the pulse 88, the abdomen soft; above and to the right of the umbilicus was situated a slightly nodulated tumour, rather larger than a hen's egg, and somewhat movable: its limits could not be exactly defined; it was free from the abdominal walls, gave pain on pressure, and shifted its position with the respiratory movements. No dilatation of the stomach could be made out. If she took meat she vomited up the contents of the stomach, with some blood. Milk, coffee, and broth she could take well. The preparatory treatment for the operation consisted in washing out the stomach, nutrient wine enemata, and the usual antiseptic measures. The operation was performed on the 12th March, 1881. No spray. An incision was made, four and three quarter inches long, as shown in Fig. 1 A. The right rectus was cut through, the

peritoneum opened, and the cancerous pylorus drawn forward as far as possible. The large omentum was ligatured with eight and the small with six silk threads; both were then cut through. The cancer was now found to be attached to the pancreas; the separation was exceedingly difficult, for Professor Billroth, in view of the subsequent danger to the digestive functions, was unwilling to ligature the pancreas. The gastro-duodenal artery and several other vessels in the neighbourhood were secured. The isolation of the pancreas alone occupied about an hour. The stomach was divided obliquely as far as the centre, as shown in Plate III, fig. 6. The organ contained no fluid. Ten occlusion sutures were now put in, and the rest of the stomach divided down to the greater curvature. The duodenum was now cut obliquely from above downwards. On this occasion no provisional sutures were inserted. The back wall of the duodenum was united to that of the stomach by five "inner intestinal" sutures, and the mucous membranes also brought together by three fine threads. The rest of the "ring sutures" were completed from the outside. The total number required was thirty-six. The operation lasted two hours and a half; very little blood was lost; none of the contents of the stomach or duodenum escaped into the peritoneal cavity. The shape of the stomach was very satisfactory, as shown in Plate III, fig. 7. The patient, who was very anæmic, was much collapsed during the operation. She retched frequently during the afternoon, in the evening became suddenly restless, and died the same night.

The excised portion measured twelve centimètres along the greater curvature, and five along the lesser. The opening of the pylorus just admitted the finger. The growth proved to be medullary cancer. At the post mortem it was found that the cut edge of the duodenum was about five centimètres from the opening of the ductus choledochus, but this, as well as the pancreatic duct, was well away from the region of operation. Cancerous glands were found near the head of the pancreas and in the lesser omentum. In addition there was great general anæmia, old tuberculosis of the apices of the lungs, and miliary tubercle on and about the pleura.

In future, the operation should not be undertaken in cases such as the above; the great anæmia and the union of the cancer to the pancreas make it a matter of no surprise that the patient died so rapidly. Another time we should abstain from excising the pylorus if an exploratory incision revealed a similar state of affairs.

Case 4.—On the 8th of April, 1881, Dr. Wölfler had an opportunity of resecting a cancerous pylorus in a patient, æt. 52. The tumour was about the size of an apple, and freely movable in every direction. A transverse incision was made above the umbilicus; the pylorus was readily isolated, as there were no pathological adhesions. The stomach, which was greatly dilated, was cut through obliquely from left to right, beginning at the lesser curvature. Ten occlusion sutures were inserted, and the stomach then completely divided. Three threads were inserted provisionally through the duodenum in order to fix the gut, which was then cut through in the direction

shown in Plate III, fig. 6. Thirty "ring sutures" (fourteen internal, sixteen external) were put in and the stomach replaced. The excised mass measured twelve centimètres along the greater curvature. The patient was perfectly free from reaction after the operation. She had no fever, vomiting, or symptoms of peritonitis. For the first four days she had retching and heartburn several times during the day. On the fifth day her condition was perfectly satisfactory. For the first nine days she was given fluid food (milk, wine, eggs), which was well borne. By the tenth day she was able to take meat. The abdominal wound healed by first intention, and the gastric region was perfectly painless on pressure thirteen days after the operation.

(Dr. Wölfler writes, under date 28th June, that this patient was then perfectly well, and was able to take all kinds of nourishment without harm. She was kept under close observation, but no trace of recurrence had, up to date, been discovered.)

The question might be asked, whether the cicatrix of the stomach after this operation would be able permanently to resist the action of the gastric juice. This may be answered in the affirmative, for we know that many gastric ulcers heal up, and the cicatrix left is not affected by the gastric juice. Further, the permanency of recovery in the cases of gasteroraphy performed by Billroth and Esmarch affords additional evidence of the fact. A patient, on whom more than three years previously Billroth had operated for a large gastric fistula, wrote to us that he continued perfectly well, could take any kind of food, and had not the least pain in the part.

Is it possible that a cicatricial stricture might originate, perhaps after some years, at the part where the "ring sutures" are inserted? Our experience of other cases enables us to dismiss this fear. Billroth performed enteroraphy on three patients in the years 1878 1879, and 1880, and he heard from them in 1881 that they were going on excellently, that they had no trouble from indigestion, and that the bowels acted normally. We may conclude, then, that no narrowing will take place at the junction of the stomach and duodenum if the serous surfaces unite by first intention. A more important question is the course to be pursued when the stomach is much dilated. Under such circumstances the best plan appears to be to attach the duodenum to the greater curvature. A comparison of the third and fourth cases illustrates this point. If in excising the pylorus much difficulty is found in drawing the duodenum over to the stomach, it would be proper to leave a fistula into the duodenum for the purposes of nutrition.

The diseases for which resection of the pylorus should be reserved are cancer and other rarely occurring tumours, ulcers of

the stomach, and cicatricial stenosis. In ulcer of the stomach, the operation will be especially indicated if the patient is unable to take any nourishment, or when the anæmia from the hæmorrhage gives cause for much anxiety. It is known that ulcers of the stomach are generally situated on the lesser curvature and the pylorus. If on the pylorus, the operation will be like those already described; if on the lesser curvature the wound of the stomach must be united longitudinally after the ulcer has been excised. This operation would only be difficult when the ulcer lies on the posterior wall of the stomach and is adherent—as it would be—to the pancreas.

Can a cancer of the pylorus be radically and permanently extirpated? The same questions arise here as with regard to the radical cure of cancer in general. As with other carcinomata, recurrence will certainly occur less often when the operation is performed early, the incisions carried wide of the cancer, and when every part that looks the least suspicious during the detachment of the omenta is removed.

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EXPLANATION OF THE PLATES.

PLATE I.

FIG. 1.—Warty hypertrophy of the scalp. (See p. 42.)

FIG. 2.—Racemose arterio-venous angioma of the nose and lip. (See pp. 86, 87.)

FIG. 3.—Hypertrophy of the integuments of the nose. (See p. 55.)

FIG. 4*a*.—Hypertrophy of the integuments of the nose.

FIG. 4*b*.—The same, three months after operation. (See p. 55.)

PLATE II.

FIG. 6*a*.—Substernal malignant bronchocele in a man æt. 61. The growth pressed on the right innominate vein. (See p. 169.)

PLATE III.

FIG. 6*b*.—From the same case, illustrates the preparation made by Dr. Chiari. The greater part of the integuments of the abdomen are shown. (See p. 169.)

FIG. 6*c*.—From the same. The abdominal integuments have been removed. The right and left sides of the heart are injected, and coloured blue and red respectively. The dotted line above the heart shows the dimensions of the substernal tumour in the recent state. In the preparation the growth had shrunk very much. (See p. 169.)

PLATE IV.

FIGS. 7*a* and 7*b*.—A child, æt. 6, with extroversion of the bladder and epispadias, cured by Prof. Billroth's method. (See p. 286.)

FIG. 9*c*.—Apparatus to provide for retention of urine after operation for extroversion, made by Hammer, of Vienna. (Not referred to in the text.)

PLATE IX.

FIG. 11.—Chronic ostitis of the left femur and tibia, with lengthening of the entire lower extremity. (See p. 424.)

PLATE XII.

FIG. 14.—Congenital absence of the femur. (See p. 467.)

PLATE I.

Portion of the stomach, 14 centimètres in length, excised in Case 1. Anterior view. (See p. 503.)

PLATE II.

The same from above. *Om.* Small omentum. *S.* Probe.

PLATE III.

FIG. 1.—Incisions for the resection of the stomach in Case 1. A part of the lumen of the stomach not yet closed. L L L, Lembert's intestinal sutures. (See pp. 498, 503.)

FIG. 2.—From the same case, after the insertion of all the sutures. (See pp. 498, 503.)

FIGS. 3 and 4.—Resection of the stomach in Case 2. Vertical incisions through stomach and duodenum. N, Occlusion sutures. L L L, Lembert's sutures to hold the stomach and duodenum. (See pp. 498, 501, 505.)

FIG. 5.—The same, with all the sutures inserted. D, Diverticulum. (See pp. 499, 500, 505, 506.)

FIG. 6.—(See p. 508.)

FIG. 7.—Shape of stomach after union of the duodenum to the greater curvature. Case 3. (See p. 508.)

FIGS. 8 and 9.—(See p. 501.)

FIG. 10.—Insertion of the posterior ring sutures from within. (See p. 499.)

FIG. 11.—Diagram of a section to show the position of the internal intestinal sutures, and the superficial sutures of the mucous membrane.

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Fig. 1.

Fig. 2.

Pl. I.

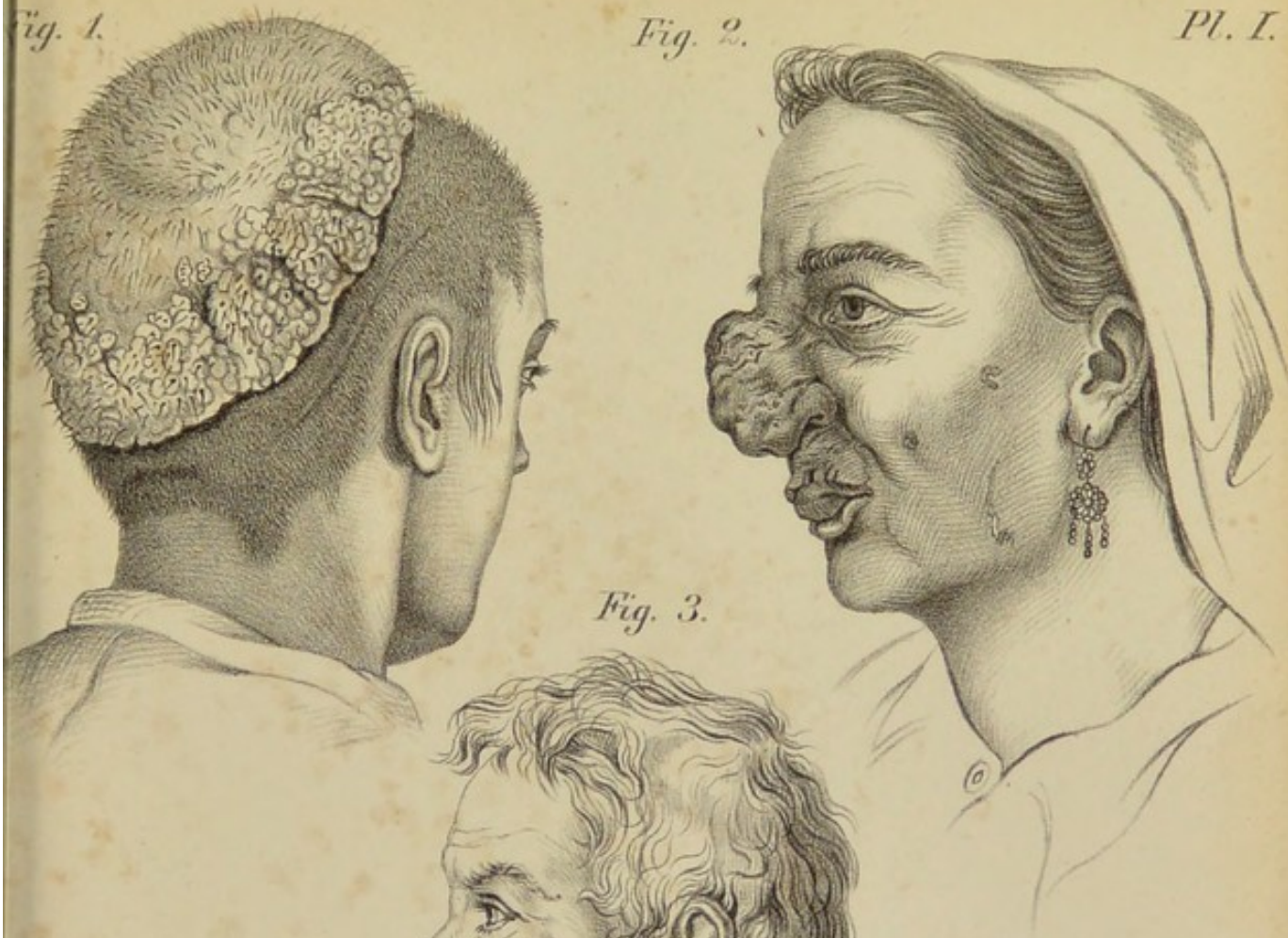

Fig. 3.

Fig. 4a.

Fig. 4b.

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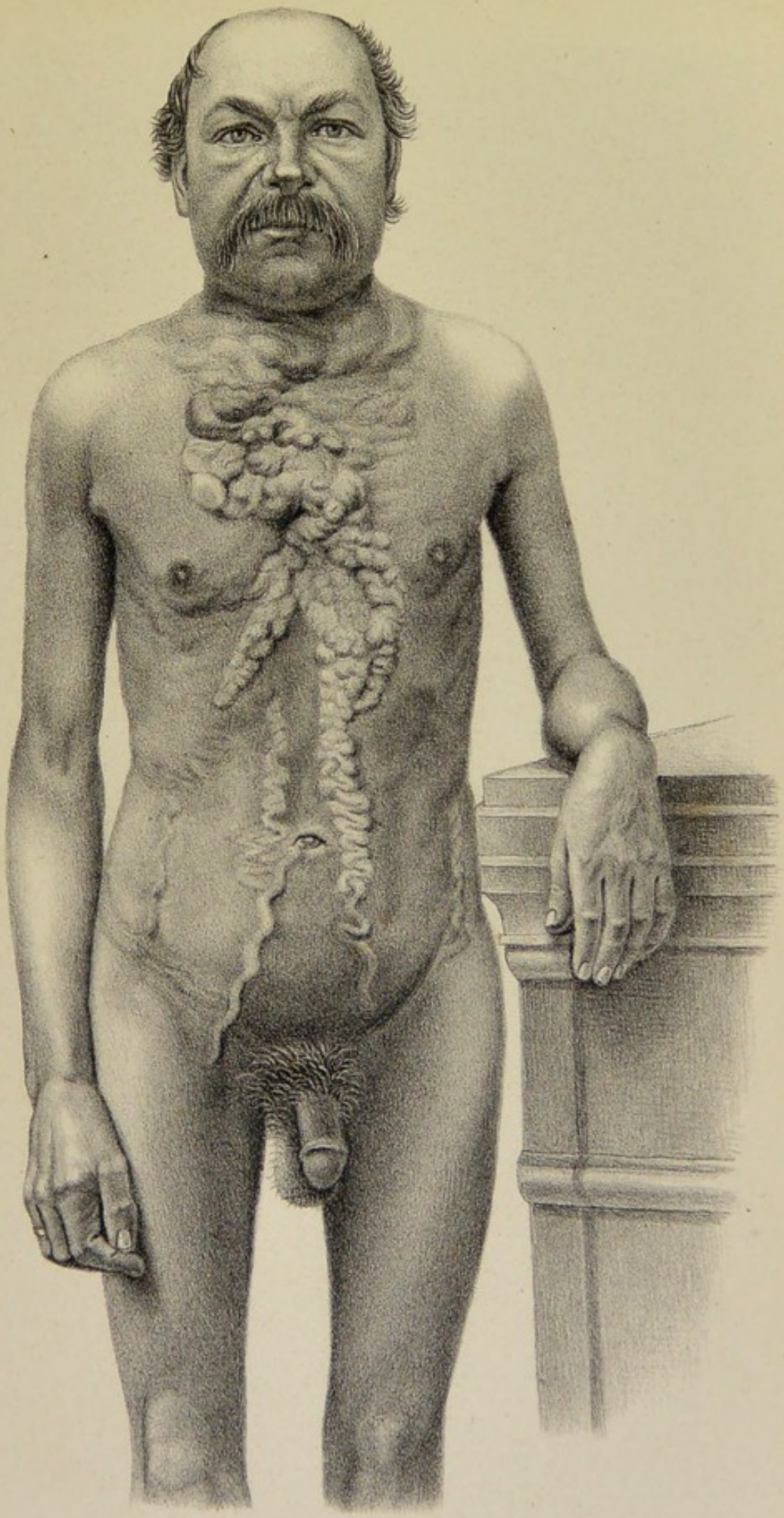

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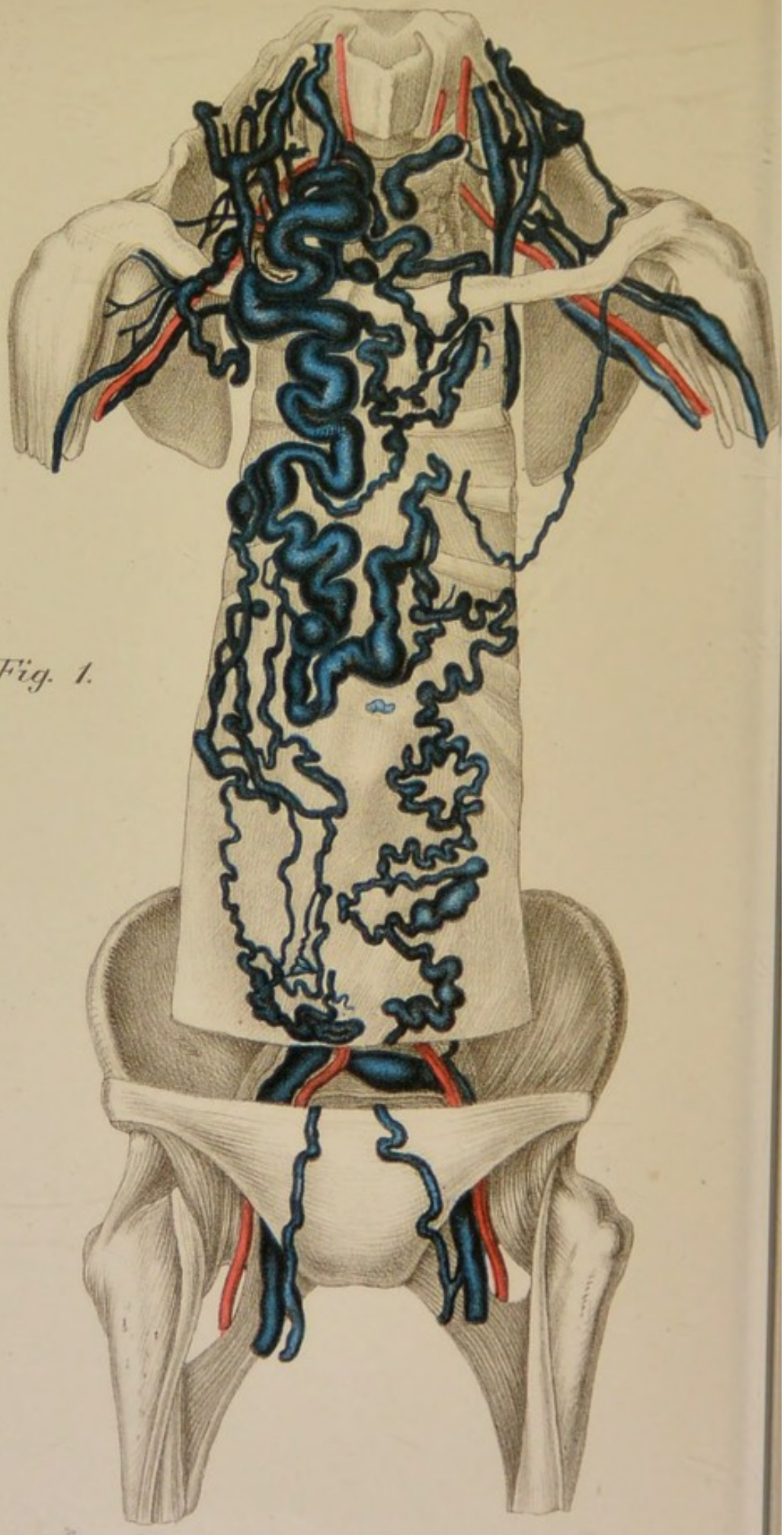

Fig. 1.

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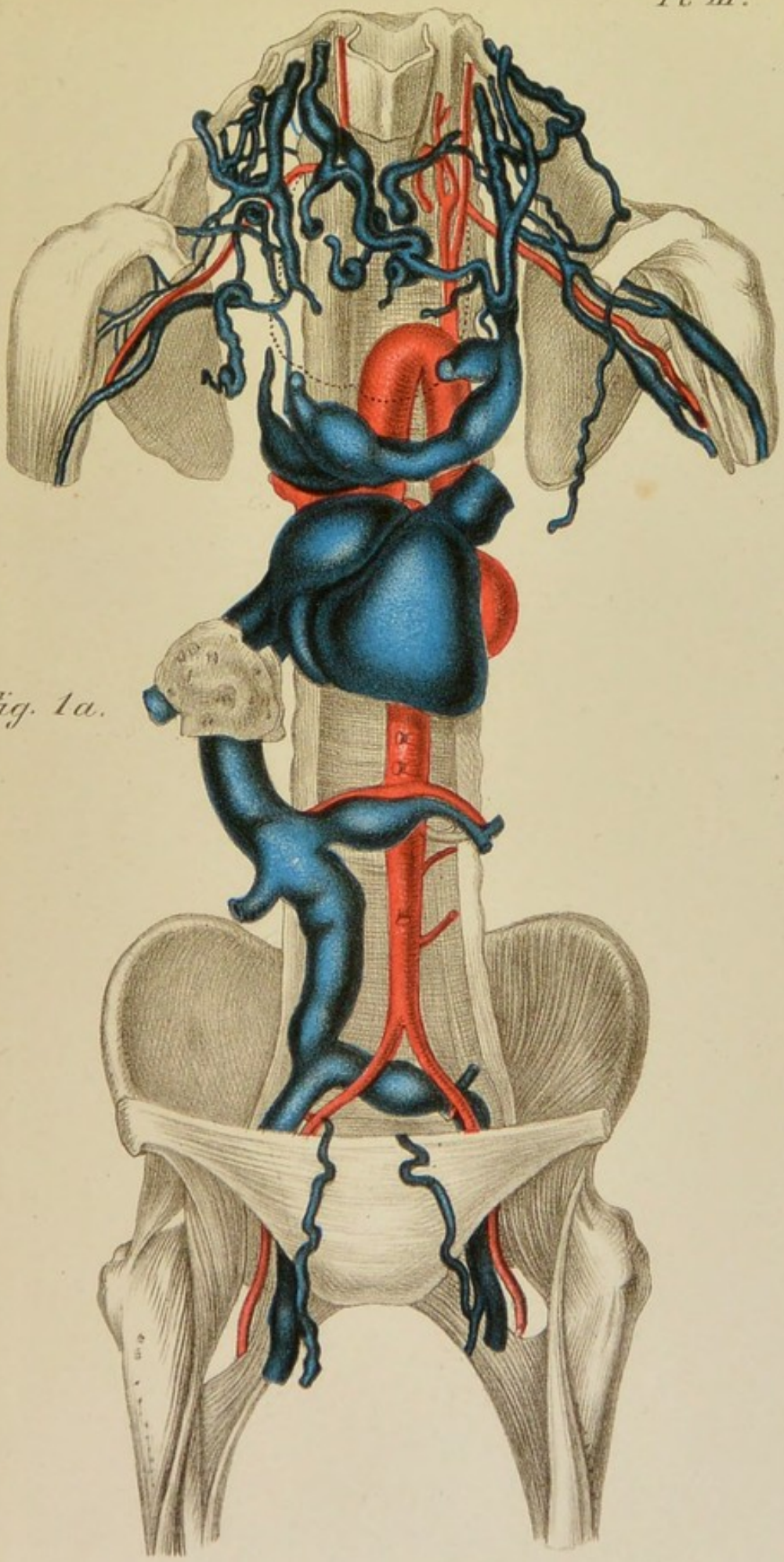


Fig. 1a.

Fig. 7a

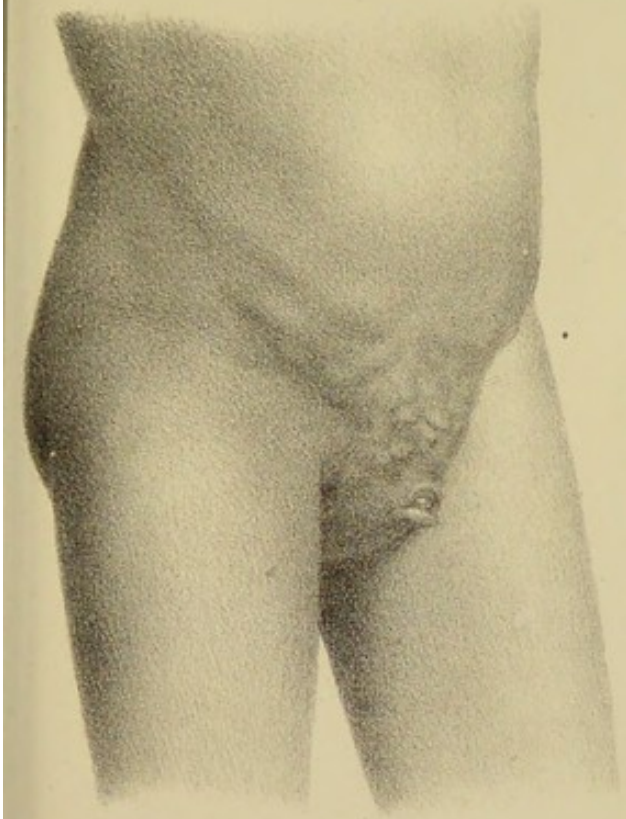
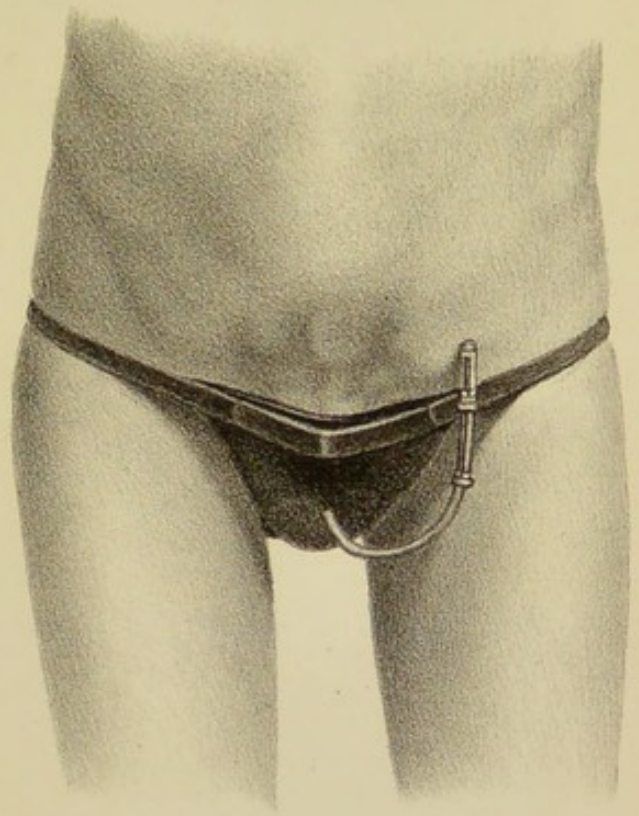


Fig. 7b



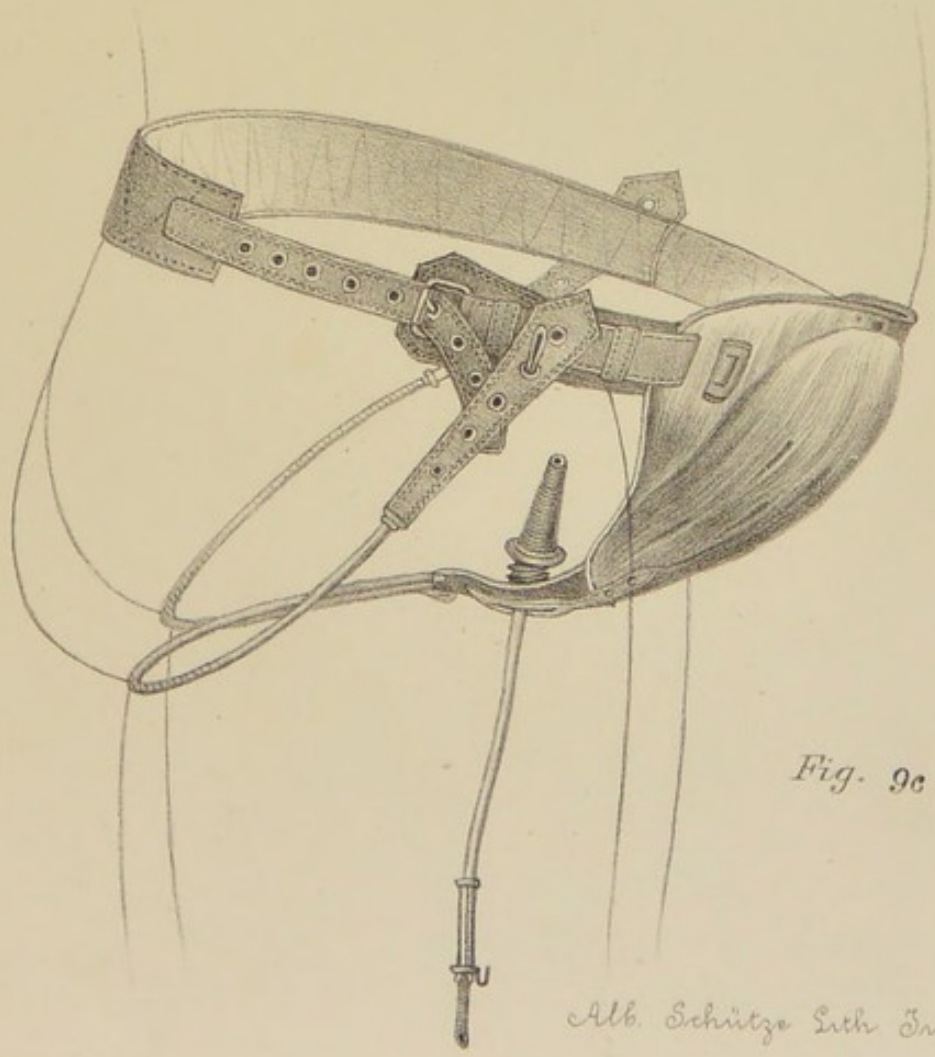


Fig. 9c

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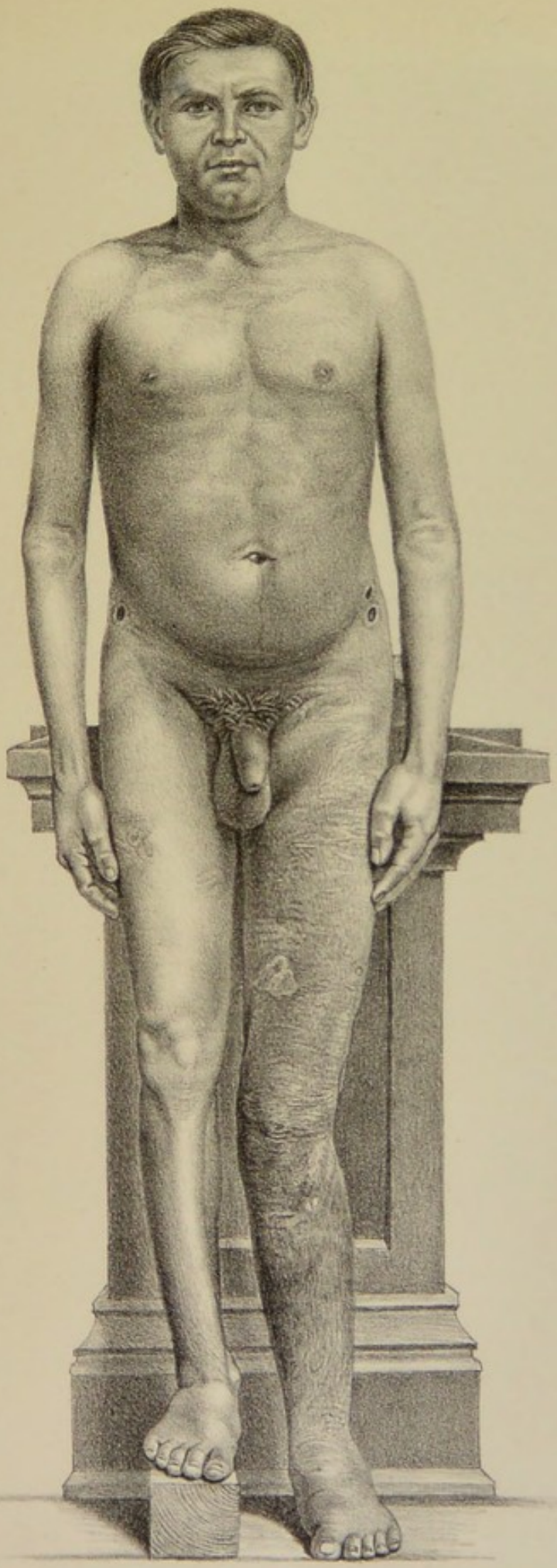

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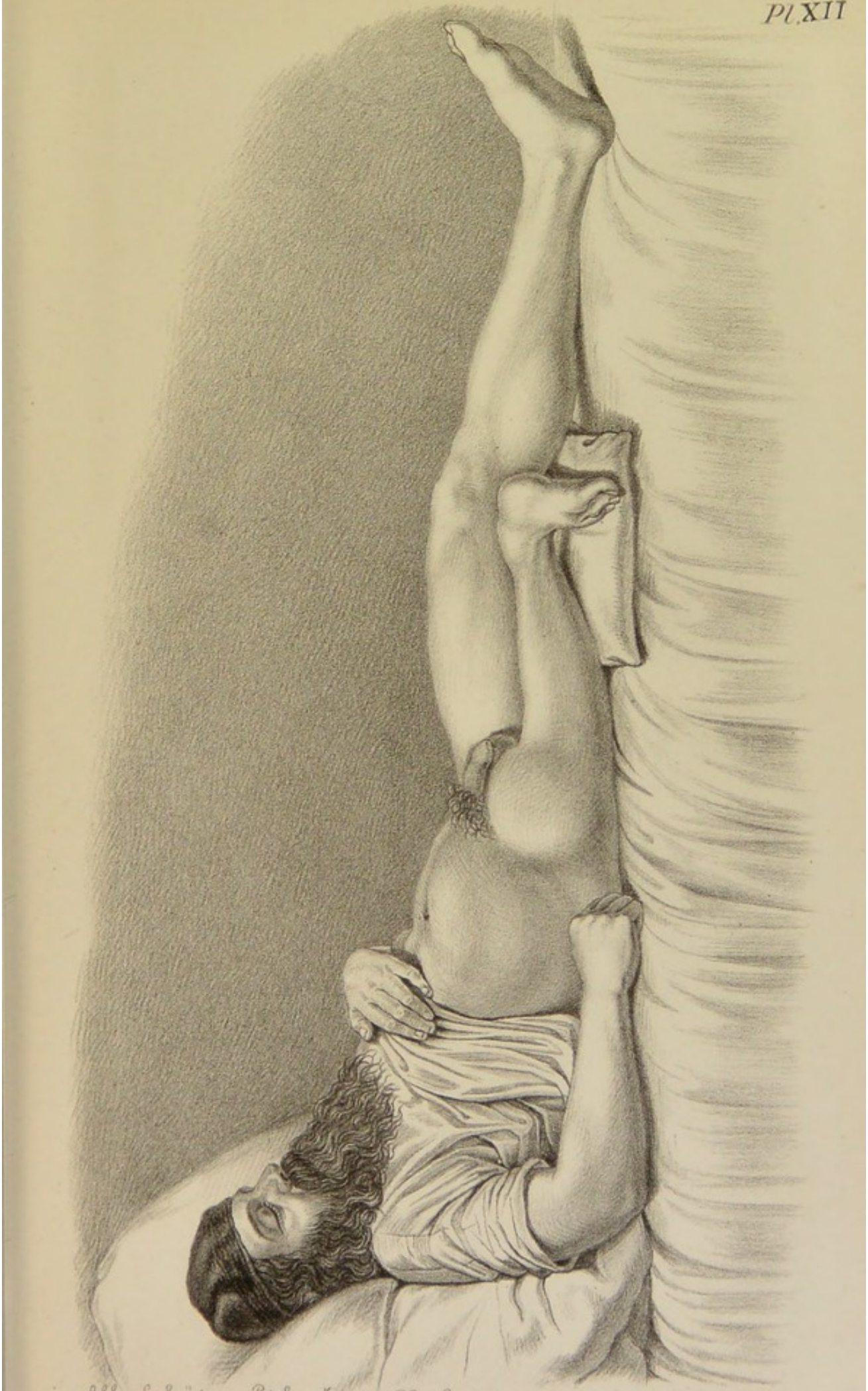

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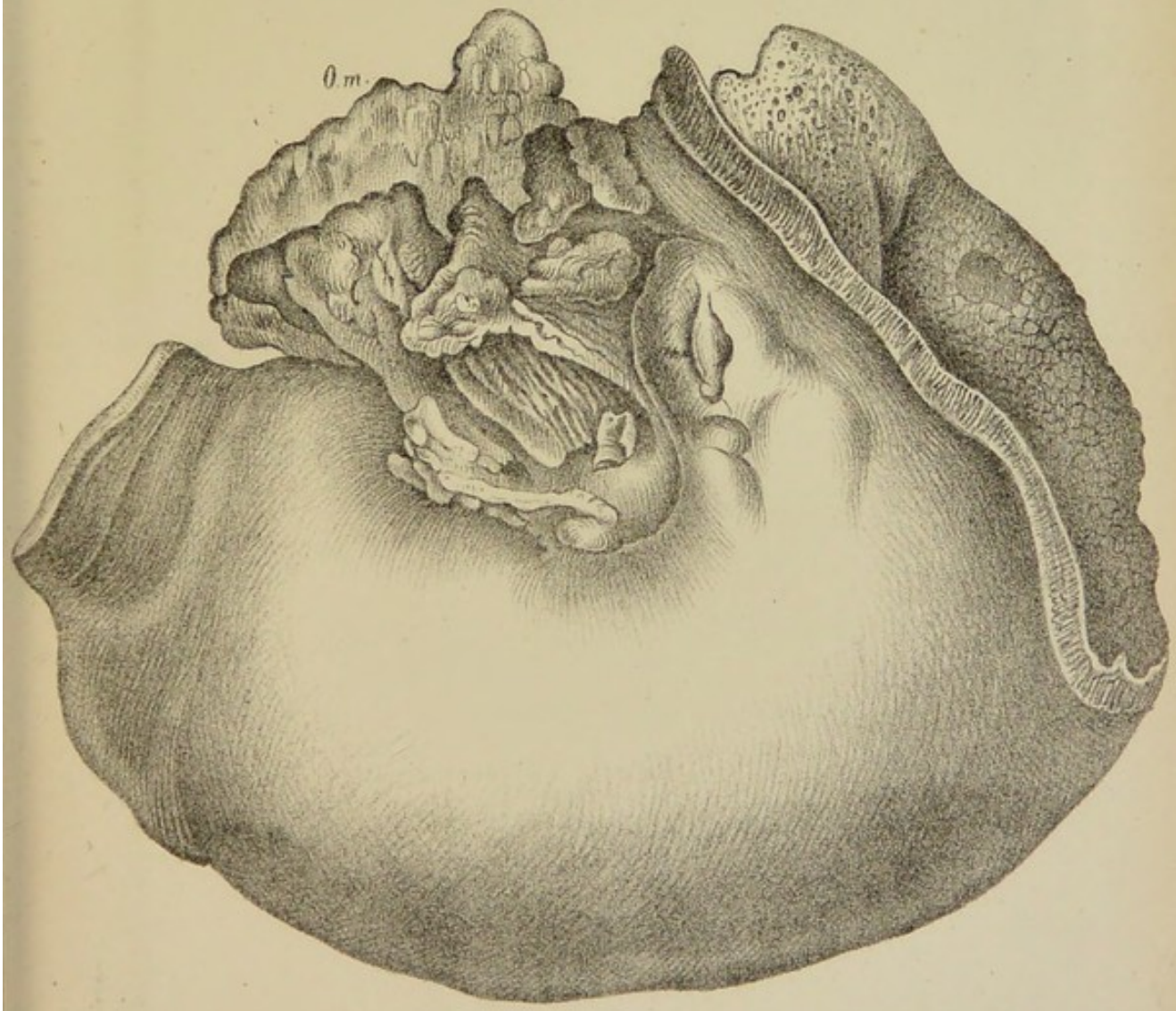

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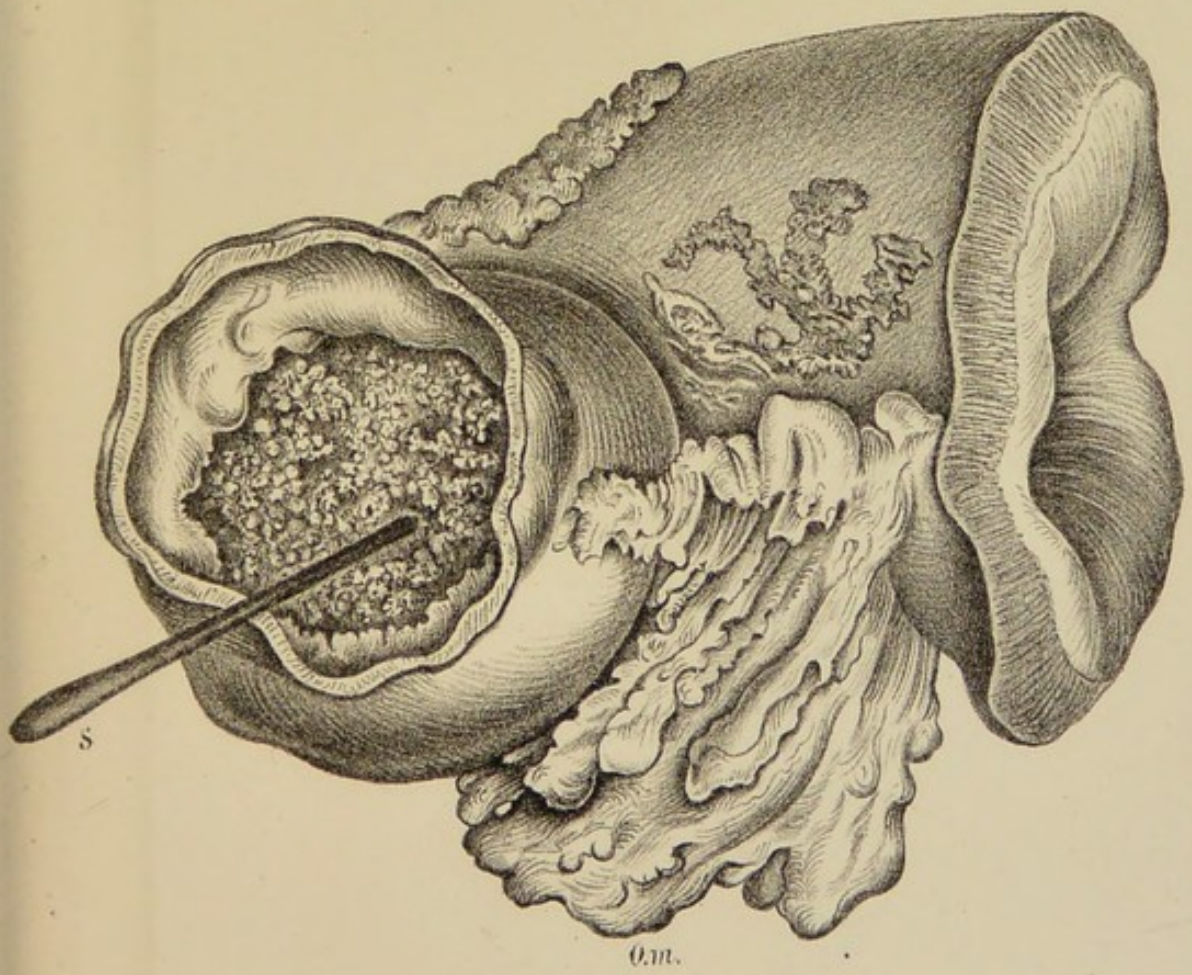

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Plate III.

Fig. 1.

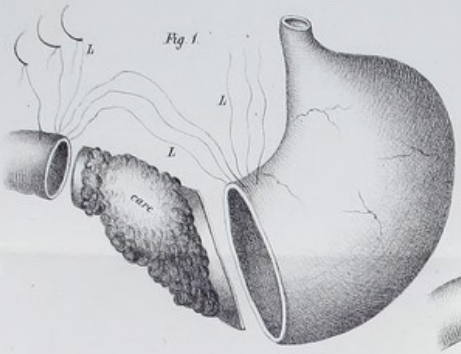


Fig. 2.

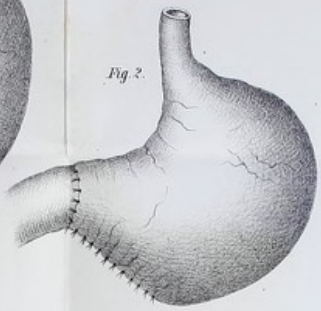


Fig. 3.

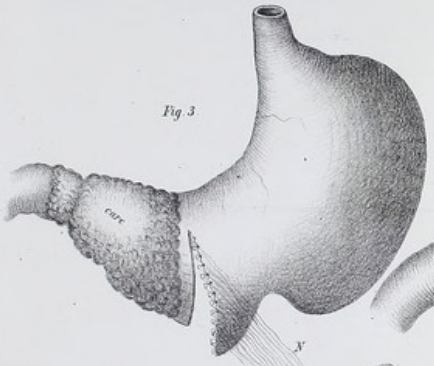


Fig. 5.

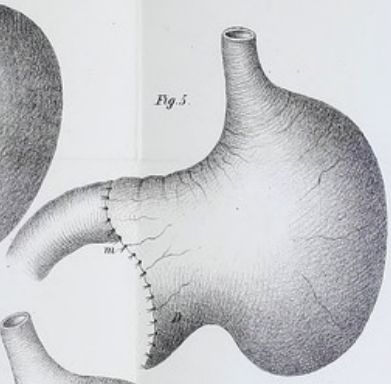


Fig. 4.

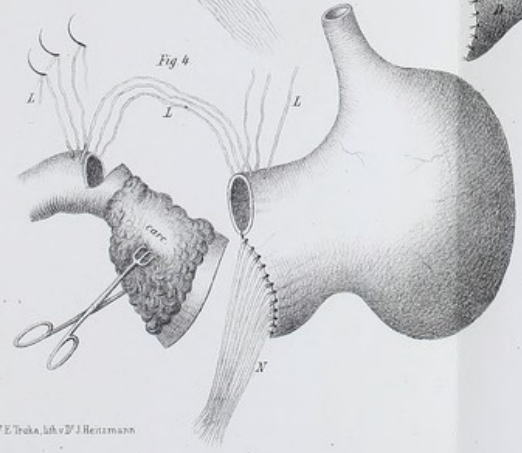


Fig. 6.

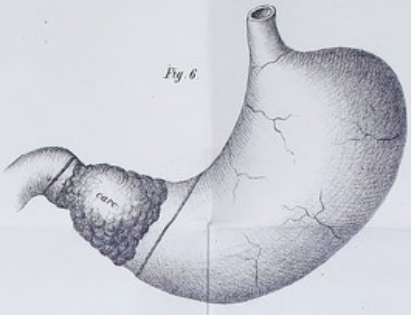
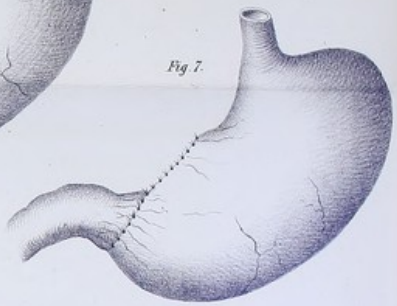


Fig. 7.



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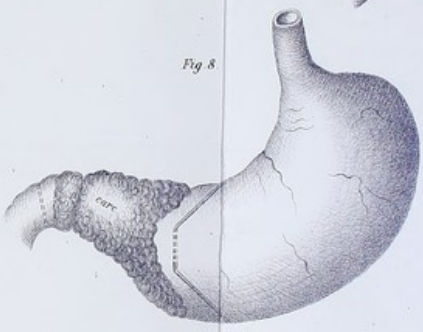


Fig. 9.

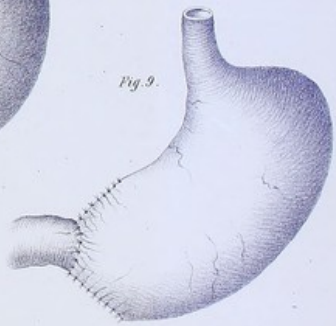


Fig. 10.

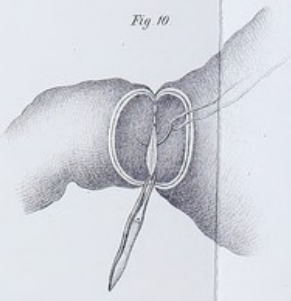
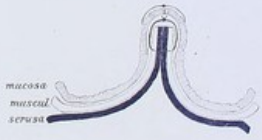


Fig. 11.



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