ferent lines. Their cases were required to be divided into certain classes; those due directly to alcohol, and those supposed to have been hastened by alcohol, etc. In fact, it was rather an opinion upon the results of alcohol that was settled rather than a statement of facts. It was a much simpler inquiry than theirs, and had been very successful. Their own inquiry had been for facts respecting certain definite diseases, which had for an object rather to make out the connection of the alcoholic habit with certain definite lesions than to ascertain the relative mortality. Statistics of insurance societies only concerned insurable lives, whereas their inquiry took in any kind of life, good or bad. He should be glad to get any further information out of these returns with regard to the very important point raised by Professor Gairdner as touching alcohol in checking phthisis. Something of the kind could already be got out of Table VII.

THREE LECTURES

ON

TUBERCULAR JOINT-DISEASE AND ITS TREATMENT BY OPERATION.

Delivered at the Royal College of Surgeons of England, June, 1888,

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LECTURE III.

I SHALL to-day ask your attention to the application of those principles of treatment which I have endeavoured to sketch in our first two lectures to the actual removal of tubercular disease as found in some of the principal joints of the extremities.

Taking the knee first as a simple articulation, and one which claims attention more frequently, perhaps, than any other, I would venture to insist that hitherto we have been too much in the habit of regarding the prospect of a movable joint after operations for the removal of tubercular disease as altogether remote. In considering conservative interference with this disease here, it has until recently nearly always been a question either of complete excision of the whole joint or of trusting to simple drainage without removal of tissue; and yet, if the matter is carefully examined, there are many cases in which such disease has existed for a long time—now in the synovial membrane, now in the bones—and yet, *without operation*, repair has taken place with little or no impairment of the movements of the part, and surely we may imitate such results by early operation.

It will be said that in such cases the primary focus had not extended actually to the surfaces of the articulation, and had been arrested early. But in the majority of cases—at all events in children—tubercular disease probably starts as a focus not actually in contact with the surfaces of the joint, and remains for a time quite outside the latter. For instance, it often begins at the growing epiphysary lines of the bones, as in the specimens from which I have drawn Figs. III and IV (hip), and V, VI, and VII (knee), and only gradually works its way either through the cartilaginous covering or out to the lateral aspect of the femur or tibia. Again, it may commence in the subendothelial tissue of the synovial membrane, and develop into a considerable caseating focus before it makes a breach of surface and attacks the parts which actually move one upon the other. We know, of course, that if such cases are left alone, this is not the rule, unfortunately; and that a large number of them will run on to destruction of the proper surfaces of the joint, and then all hopes of preserving its movements become very remote indeed.

Ought we not, then, to look out for cases in which we may by limited operation anticipate this extension of the process to the surfaces, or, at all events, arrest its destructive action on the latter? Undoubtedly; and, if we work more in this direction, the reward will be not only the frequent arrest of *general tuberculosis*, but also the preservation of the movements of many a knee in which otherwise a more complete excision of one kind or another would have to be performed later on.

A good method of exploring the knee-joint in which such disease is suspected to be on the increase, but where there is a hope

of preserving the movements of the part, becomes, then, an important desideratum. Out of the large number of operations proposed and practised since the days of Filkin and Park, the most experienced surgeons to-day appear almost universally to adopt the well-known "horse-shoe" or "U-shaped" incision of Moreau, modified more or less. When exploration alone is the first object, half this incision may be made on one side, reaching from above the joint to the border of the patellar ligament, as in Fig. VIII. Or, again, the two halves of the curves may be made down to each side of the latter, but without dividing it. Adopting one or other of these methods of exposing the surfaces of the articulation, its general condition may be fairly estimated in most cases, and indications for further action be discovered. In the first place, while making such an incision, especially in a case of early disease, it may be found that the knife passes through the tuberculised area before it actually opens the joint. A large quantity of granulation tissue, with or without caseous foci, may be met with, and quite possibly in such a position that it can be freely removed without interfering with the essential structures of the joint. Or, again, the appearance of the lateral aspect of the femur or tibia may indicate the presence of centres of tubercular osteomyelitis about their growing epiphysary lines, as in Figs. V, VI, and VII. In such a case it may be quite feasible to remove all the infected medulla either by gouge or sharp spoon without the least damage to the gliding surfaces of the bones; and, even if the cartilaginous covering be encroached upon to some small extent either from within the bone or from without, it is quite possible to sacrifice a certain amount of it without injury to the prospect of a movable joint. Some cases in which this has been done have been put on record lately by Sandler, with the result of almost perfect preservation of the functions of the part. And, after all, this result will depend almost entirely on the stage at which operation is performed, now that antiseptics has eliminated the risks of setting up true suppuration in the joint by our operation. For of course the mere rupture of a caseous focus into a joint does not mean the general suppuration of the latter, unless the focus itself also communicate by a sinus with the external one.

Now the moment such tubercular tissue is found the risks of re-inoculation from it during its extirpation must be kept in view, especially if it have reached the stage of caseation. If it be possible, by turning back the skin and muscles on either side, to expose the whole diseased focus from our limited incision, it should be isolated by as careful a dissection as if it were a malignant growth, and the knife should at every stroke be carried through sound tissue around. At the same time the escape of caseous matter into the fresh wound, or into the cavity of the articulation, should be prevented by every means in our power. If, unfortunately, it should be impossible to prevent such contamination of the cut surfaces altogether, they should be as rapidly and as thoroughly cleansed as possible by irrigation with one or other of the powerful germicides at our command. The choice here appears to lie either between carbolic solution or bichloride of mercury.

Large areas of diseased synovial tissue may in this way be extirpated from the knee, as low as the ligamentum patellæ and as high as top of the subcrural bursa, without any interference with the continuity of the lateral, crucial, or patellar ligaments. Cases are now accumulating in which this has been done, and all the movements of the joint have remained perfect. Koenig's and, more recently, Sandler's cases are perhaps the most encouraging, especially as in some of the latter portions of bone had been also removed.

The actual opening up of the joint in such a case should be postponed until the diseased area in the synovial tissues has been isolated as far as possible. Finally, after flushing the parts divided with our germicide solution, the separation of the infected tissue is completed, and it is lifted out *en masse*. The condition of the ends of the bones can now be examined, and, if the patient is an adult, it is quite possible that the cartilaginous surfaces may be almost or quite intact, unless the disease has been allowed to run on too long. In such a case, after careful irrigation of all the pockets of the articulation, and subsequent drying out with sponges, all the exposed surfaces should be dusted with finely crystalline iodoform.

Deep stitches, including the muscular expansion and skin, should then be inserted, about half an inch apart, throughout the whole length of the wound. These silk threads are not tied until all are in place, and until the final toilet of the wound has been completed. A drain-tube is not always indispensable, but may

with advantage be left in one of the angles of the wound, for the first twelve hours or so, in most cases.

But, supposing that the free single or double lateral incision reveal the fact that the cartilage-covered ends of the bones are seriously affected, either primarily or secondarily, the joint must be more freely exposed. This is best done by completing the formation of the U-shaped flap (Fig. VIII), in order to turn it up from the lower and anterior surface of the femur. In doing this, of course the simplest plan is to sever the ligamentum patellæ, trusting afterwards to careful suturing to restore its continuity. But, if there is any prospect of preserving the movements of the articulation, this structure should be kept intact, if possible, for obvious reasons. This can only be done by removing the tuberosity of the tibia, and leaving it attached to the ligament of the patella. There is no difficulty in this, if a good chisel is used, and is driven obliquely upwards and backwards, under the tuberosity, into the joint. The scale of bone thus removed can subsequently be wired down in its old bed, and one of the chief supports of the joint will be thus preserved intact. When the long U-shaped flap has been formed, as just described, and has been turned well up, there is no part of the joint which cannot be thoroughly examined during complete flexion.

Another method of exposing the interior of the knee-joint, while preserving the extensor mechanism intact, has been often practised within the last few years, and deserves some notice. This is the transverse incision across the middle of the patella, the latter being sawn completely through. Now there is no doubt that, with the safeguards of asepsis, this method is as justifiable as any other for opening the knee-joint, and that, when subsequently wired, the patella becomes as sound as ever, and the action of the extensors is preserved. But it is agreed by those who have had most experience of it that the transverse incision alone does not give as free access to the various parts of the joint as is required; and even Volckmann, with whom the plan I believe originated, was obliged to supplement it by vertical lateral incisions, which enabled him to turn the soft parts upwards and downwards with more freedom. Neither this method, nor that of Verneuil (lately revived), in which an H-shaped cut is made with the transverse stroke *above* the patella, appear likely to hold their own against the old U-shaped incision, which possesses many of the advantages of the other methods without their drawbacks.

If, in performing the operation by this U-shaped flap, the tuberosity of the tibia be lifted up with the latter, and then subsequently wired down *in situ*, all the advantages of the method of dividing the patella are secured, and there can be no question of the freer access to the joint. But, whatever else is done, it should never for a moment be forgotten that our first object is to rid the patient of a distinctly dangerous new growth, and that all questions as to the functions of the joint must take a second place.

The points to be specially examined in these cases will be, first, the several synovial pockets, and then the epiphysary lines of the femur and tibia, especially at their lateral aspects. Here it will be frequently found in early cases that a focus of tubercular osteomyelitis extends more or less deeply into or across the bone, sometimes without transgressing the cartilage (Figs. V and VI). In such a case, let me repeat, it may be quite feasible to remove all the diseased tissue by careful gouging from the side without damaging the joint-surfaces at all. But, be this as it may, it must be remembered that, if be possible to cut around the focus in healthy tissue, and to lift the diseased mass bodily out without crushing it, and with a layer of sound material around it, the chance of re-inoculation of the medulla remaining is much diminished. Even from the joint-surface it is quite possible to do this without serious interference with the shape of the articular facets in many cases. A few months ago I was able thus to remove one of those conical foci of carious bone the shape of which, as Koenig points out, suggests their formation by the blocking of a nutrient artery by tubercular disease. It lay in the external condyle of the femur, with its base at the articular surface; and, though the gouge was carried well outside of it in healthy tissue, and a portion of the inner aspect of the external condyle as large as half a walnut was removed, the shape of the joint has not been damaged; and I have lately seen the patient walking about comfortably, although in this case with a stiff joint, but not in the least a shortened limb.

In passing I may remark that such cases as the one just referred to offer an excellent illustration of the advantages of the

most recent methods of dealing with tubercular joint-disease. Here was a girl of eighteen who had been under my care for the same affection for eight years, during the last three of which she walked about on a Thomas's splint and never put the foot to the ground. All this time she was carefully treated both at home and in hospital, but the knee remained swollen, tender, and was now quite stiff, and walking was impossible. Last Christmas she and her mother begged that she should be operated on. I therefore laid open the joint by the U-shaped incision, removed all the infected synovial tissue, and a large focus of tubercular osteomyelitis from the femur as described. The wound healed by first intention under the second dressing, which was replaced by dry wool and a plaster-of-Paris case on the tenth day. A day or two later the patient was out of bed; within a month from operation she was at the seaside, and within six weeks was able to walk about on the limb, which had not been used for years. She wore the same plaster case for about another month, and on her return to London I removed it, and found the state of the joint all that could be desired. She could walk well without the splint, but was given a lighter support instead. I believe that for the last couple of months she has been at work again; and I saw her yesterday, perfectly well.

In this case, an operation, which did not interfere with the length of the limb or its growth, which did not confine the patient to her bed for a fortnight, or to the house for a month, gave her back the use of her leg within eight weeks—a result which eight years of careful treatment by other means had failed to produce. From what was found at the operation on this joint, it is probable that further delay would have resulted in extension of the disease, which would then have required for its removal the sacrifice of some of the length of the bones, to say nothing of the other risks to which the patient would have been subjected.

It is perhaps a little too soon in this case to pronounce that re-inoculation of the system from the wounded surfaces cannot have taken place during the operation. But we know enough to say that this is unlikely. From all the cases where such an occurrence has taken place that I have been able to study, it seems probable that, unless there is evidence that the disease has taken a fresh start locally or in internal organs within a couple of months or so, it is not likely to reappear at all from this cause, provided the patient's surroundings are healthy.

There can be no question, as already stated, that such re-inoculation of the soft parts and of the fresh cut bone does often take place in excisions of tubercular joints. Cases have been recorded specially to elucidate this point, and leave no doubt, to my mind, upon it. It is probably a frequent cause of that secondary development of foci of disease, long after operation, which is well known to us all. Hitherto it has been the custom to attribute this reappearance of the disease to its spread from portions of the original foci not thoroughly removed by the operation. But although this explanation will meet some cases, it will not account for all. The evidence is strong that a healthy cut surface of bone may be inoculated from the caseous *débris* in process of removal from another part of the joint, and may develop fresh foci of tubercular osteomyelitis as a consequence in due course. Much may be done, of course, in the way of washing away tubercular *débris*, accidentally distributed over the fresh cut surfaces in the course of an operation, and germicides may be brought to bear upon them before the wound is closed. But as the latter must be used sparingly in view of their toxic effects on the system, it should be our aim to prevent, by every means in our power, the scattering broadcast over the wounded surfaces of the part those seeds of further disease which we know from experiment are so ready to strike root even in uninjured tissues, and the evil effect of which we have heretofore been only too familiar with when, after an excision has been soundly healed for some time, caseous abscesses have formed, and have slowly worked their way to the surface.

Not infrequently, in examining a tubercular focus in the cancellous tissue of the end of a bone, we will observe that its spread has been prevented, as it were, by a process of sclerosis in the tissue around—a process quite analogous to the formation of the limiting area of exudation tissue, demonstrated by experiment, around points inoculated with tubercle in the eye and elsewhere. (Fig. I.) If such a sclerosis exist in any given case, we should be careful, in gouging out the diseased matter, not to go beyond this barrier, erected by the natural processes against the spread of the disease.

I shall now ask to be allowed to describe in detail the method I

should employ to get rid of the infected tissues from a knee which has been discovered by exploration to possess a *widely* diseased synovial membrane, the bones being little or not at all affected. If I venture to describe this as the plan I have adopted myself, it is with no wish to dogmatise. No one is entitled to do this in the case of a subject so comparatively new to us all, and where all our individual experiences must still be relatively scanty. My wish is simply to express, in a definite form, the conclusions which have gradually worked themselves out during many years in which I have been a close observer of the methods of others in this field of surgery, as well as an anxious student of my own clinical and pathological material. We have all, Sir, no doubt been obliged to revise our procedures over and over again, in view of the advances in the theories of wound-treatment, and of the pathology of tuberculosis; and all of us must be conscious that we are still but feeling our way. Those who have given the most attention to the subject will be the readiest to admit that it is still fraught with difficulty. Of my own experience of the methods about to be described, I will only say that, as far as it goes, it is most encouraging, contrasted with older procedures; and that the results have been far beyond what I should have believed within the range of possibility a few years ago. And I know, further, that this has been the experience of many others whose line of action has been practically the same.

The limb having been kept in the vertical position for five minutes, so as to reduce the blood-stream to the utmost, a broad band of india-rubber is placed tightly around it, as near to the groin as possible. It is well not to use the Esmarch's bandage in the ordinary way for several reasons. In the first place, its pressure may break up some of the caseating foci, and disperse their contents either into the tissues around, producing local infection, or into the lymphatics or veins, and so lead to general infection of the system. In the second place, it is an advantage to leave a small amount of blood in the vessels of the part, so that these may be recognised when cut, and tied before the elastic tourniquet is removed. Finally, the loss of tone in the walls of the vessels, produced by the prolonged pressure of the elastic band, is usually followed by such copious oozing as to necessitate an early change of the first dressings. Such a disturbance of the wounded surfaces is most undesirable, if it can be avoided. Quite apart from the increased risks of septic inoculation from every exposure of the wound, disturbance of the part is likely to produce increased vascular excitement, and this again favours the development of tubercular infection, both local and general, as we have seen. Again, if extravasated blood find its way into the tissues around the field of operation, such blood offers one of the best cultivating media for the bacillus tuberculosis that could be provided, and is very likely to be inoculated during operation. The compression of the joint, then, by means of the elastic band is better dispensed with.

After every precaution as to asepsis, the knee is now laid open by the U-shaped incision, and the resulting flap, including all the structures down to the bone, is turned up. Then, commencing at the tip of the flap, the thickened synovial tissues are dissected cleanly off from the under surface of the quadriceps in one continuous strip, until the upper reflection of the subcrural pocket is reached. The dissection is then carried down over the front of the femur, leaving the latter quite clean. The joint is next well bent, and all diseased tissue is carefully cleared away from the inter-condyloid notch and ligamentum posticum, and, finally, from the lateral aspects of the joint, and from the upper surface of the tibia. In short, the whole synovial membrane is peeled systematically from the surfaces of the cavity, as nearly as may be, in one continuous tract. If the crucial and lateral ligaments are sound, they should be spared, and the same may be said of the semilunar cartilages. The surfaces of the bones and their epiphysary lines of growth must now be very carefully examined, and all tubercular foci be removed with a sharp spoon or gouge. Gentle pressure on the soft parts will now make evident any small vessels by forcing out their contents. These can be treated either by twisting or ligation, but, as a rule, there are very few bleeding points to be seen, and these can be quite adequately dealt with by a few minutes' forcipressure while the other steps of the operation are being completed.

The whole area of operation is next flushed with our germicide solution in such a way as to remove all traces of *débris* and blood clot, and carefully dried with perfectly clean sponges. It is then lightly dusted with finely crystalline iodoform, in such a way that every portion of the cut surfaces is reached by it, *but in small*

quantity. After this, the flap is laid down, and the sutures of carbolised silk are placed *in situ*, but not yet tied, the whole cavity under the flap being in the meanwhile filled with sponges, with which pressure is kept up upon every part of the wound. When all the sutures are in position, the sponges are removed, together with the last traces of moisture, and the bones are finally adjusted in a straight line with one another. Then the stitches are tied evenly, closing the wound everywhere except at either angle, where a small drain-tube is placed.

The dressing which I have myself used in cases of this kind is ordinary salicylic wool, but I have no doubt that there are other aseptic materials equally good. But much depends upon the way in which the first dressing is adjusted—more, I believe, than upon the aseptic material employed. Our aim is to apply even pressure in such a way as to check, as far as possible, all oozing into the extensive wound underneath, and at the same time to allow of the escape of any blood or serum which may be exuded in spite of the pressure within the first forty-eight hours. Perhaps the best way of attaining these objects is to cut a flat pad of salicylic wool, one inch thick, exactly the size and shape of the flap, and lay it upon the latter; then to carry a strip of the same wool, about three inches broad in the line of the wound, but about half an inch from it. The incisions and drain openings are now seen between the edges of the two pieces of wool, which do not touch or press exactly upon them. Then long strips of wool are carried round the joint, including the two pieces first applied, until it is covered deeply from well above to well below the knee. This thick layer of dressing, if evenly adjusted, may be firmly bandaged, and thus all the deeper parts of the wound are brought into contact, except at the drain openings.

Nothing now remains but to remove the elastic tourniquet, and secure the limb in an apparatus. In these cases, probably, no appliance is superior to a piece of Gooche's scored splint, carried from the fold of the nates to the tendo Achillis, and well and evenly lined with wool. When firmly bandaged over the latter, it gives all the support that is required to the joint.

As soon as the patient is in bed, the limb should be placed in the *vertical* position, and be secured thus; this is a most important part of the after-treatment, lessening as it does the tendency to oozing of blood into the wound, with all its attendant inconveniences and risks.

After this, the less we interfere with the wound the better. If the pressure on the wool have been properly graduated, the whole wound will in most cases heal by first intention under the dressing which was applied on the operating table. Those who proceed as above have many such cases to point to. But, if there be any soaking of serum through the dressing, and it appear under the gluteal fold, the limb, at the end of twenty-four or forty-eight hours, should be placed in the horizontal position, the Gooche's splint be unfolded, and the moistened dressings be replaced by dry antiseptic wool, applied as before, the incision and its neighbourhood being dusted with iodoform. At the same time, the drains may be removed. Personally, I prefer at this dressing to put the limb up once for all in plaster-of-Paris from foot to groin, and leave it untouched for two or three weeks. The plaster case can then be slit up, and the stitches be removed, without any lifting of the limb out of its bed; and, when a little fresh wool has been laid over the incision, a few turns of a bandage will make all as secure as before, and such a splint will last until the patient is able to walk about.

But perhaps it might be better to advocate, as a routine treatment, the use of the Gooche's splint for the first ten days, then the removal of drains and sutures at the same time, and the application of the plaster splint once for all.

It will be observed that no mention is made of provision for purulent discharge. The reason is that pus is not seen in cases thus operated on except as a very rare exception. We expect these cases to heal by first intention, and they do so. I am speaking now of cases in which no sinuses existed at the time of operation. And, even in a case with a few sinuses, union without suppuration may sometimes be achieved if the dissection of the diseased tissues has been very complete, and if the borders of the openings have been thoroughly cut away at the operation. But it is to be devoutly hoped that in the future all cases of this disease will be treated by operation before sinuses have formed. Scraping out of the latter, it should be noted, is not sufficient as a rule; they must be cleanly dissected out, so that union by first intention may take place along their track.

Treatment such as the above combines nearly all the require-

ments which, as I have already shown, are demanded in an operation for tubercular disease of the joint, whether we aim at the preservation of movement or at ankylosis. If the first, the absolute rest will favour repair without exudation, and if the latter, consolidation will be promoted in the best way. I cannot think that any pegging or wiring of the bones is necessary except in rare cases. If the patient is young the ends of the bones are mostly cartilaginous, and no amount of wiring will cause them to unite by osseous tissue; and if they are adults, and the encrusting cartilage has been damaged, firm union is to be expected if the parts be simply kept in close apposition and immovable. In any case, no displacement can or will take place if the joint is firmly splinted from the first in the fully extended position, and as long as it is thus supported, especially with plaster-of-Paris, there need be no fear on this score. Young patients will always require such a support for months after operations in which the ligaments of the joint have been destroyed, for there is a great tendency to flexion and displacement if the limb be left to itself; but this tendency can be counteracted by splints until it ceases.

Now as to the question of formal classic excisions, with sawing off of the entire ends of bones. I venture to foretell that after the next few years when the principles underlying the treatment of tubercular disease are better understood and the necessity of early operation is recognised, such operations will be some of the rarest in surgery. They will be replaced entirely, I believe, by the extirpation of localised foci in the bones without any sacrifice of their length and growing power. What a gain this alone is likely to be, need not be further dwelt upon. And that it will affect the subsequent course of the whole tubercular process in the system I firmly believe time will show, when we have accumulated enough cases operated on by the newer methods for reliable statistics.

OPERATIONS ON THE HIP-JOINT.

In operations for the removal of tubercular disease of the hip-joint, bone will almost always have to be sacrificed for several reasons. In the first place the disease starts more frequently in the head of the femur than elsewhere as far as can be ascertained at present, and I have sketched in Figs. III. and IV. the usual position of its initial lesion. Secondly, the anatomical arrangement of the synovial membrane is such that it can hardly be infected to any marked degree without participation of either the head of the thigh-bone, the acetabulum, or both together. And although attempts have been made to extirpate the diseased synovial membrane without excision of the bones, I believe such attempts have so far proved abortive. But although all this may be admitted, it is equally clear from our present knowledge of the pathology of the affection and our experience in its treatment that we ought nowadays to be able to effect the objects we have in view by a far more limited removal of bone than was formerly considered necessary in most cases. Remembering that primary osseous disease of this joint is always limited at first to the head or its epiphysary growing line (Figs. III. and IV.), or to the epiphysary lines of the acetabulum, and, that having once started in either of these situations it cannot spread far without involving the whole joint in a very serious way, it ought to be our object to interfere at a very early stage. If this is done, it will never be necessary to undertake those ghastly operations in which in former days the whole acetabulum, with large portions of the ilium, ischium, and pubes, together with the whole head, neck, and trochanteric portions of the femur were removed at one or more sittings. In the future if we watch the early development of hip-disease closely, we ought never to find it necessary to remove more than the head and part of the neck of the femur, and in some cases, the central portion of the acetabulum. Hence the wide-reaching incisions of former days are no longer necessary as regards the soft parts, and the forcible dislocation of large portions of the femur out of the wound are quite uncalled for. In every case now considered suitable for excision, the head of the bone can be sawn off *in situ*, and the acetabulum be dealt with through very limited incisions in the soft parts. Allow me to remind you again that I am referring now to cases in which no sinuses are present or have only very recently formed. Where many sinuses exist and true suppuration has been present for some time I believe that a case has been made out fully against any formal excision and that such cases as a general rule stand a far better chance when treated simply by rest and the laying open and washing out of abscesses with free drainage.

For excision of the hip then as we hope to see it practised from

henceforth, very limited incisions are demanded, and there are now two such which appear to compete closely for the general favor, namely, that on the outside of the joint (Fig. IX.) and that on its anterior aspect (Fig. VIII.). The first of these, known throughout Germany as Langenbeck's operation, is notwithstanding acknowledged there to be merely a revival of the original procedure proposed by C. White, of Manchester, for the removal of the hip-joint, in the year 1769. The second, or anterior incision, was first adopted in Germany by C. Hueter in 1878, but independently, I believe, a little later by Mr. R. W. Parker in this country, by whose name it is perhaps best known here.

Fig. VIII.—Excision of the Hip-Joint by External Incision. The incision runs in a line from the posterior superior iliac spine over the middle of the trochanter, the limb being semiflexed and adducted.

In White's operation, the limb being semiflexed and adducted, a straight incision is made over the head and neck of the bone in the direction of a line running from the posterior superior iliac spine to the middle of the trochanter (Fig. IX.). This incision should commence fully two inches above the tip of the trochanter and be continued down on the outer aspect of the latter for an inch and a half. It should lay open the capsule of the joint with one stroke, after which there is but little difficulty in dividing the neck of the femur with a narrow saw outside the focus of disease and removing the proximal portion of the head and acetabulum while the edges of the wound are held aside. Occasionally, however, there may be some difficulty in reaching all parts of the affected cavity through this single incision, in which case those operators who employ this method habitually are accustomed to split the trochanter vertically for about an inch with a chisel, and then separate the two halves without disturbing the tendons inserted into them. This method undoubtedly gives much freer access to the neck of the bone, and indeed to all parts of the joint, and adds but little to the severity of the operation. Subsequently the two halves of the trochanter fall together and adjust themselves in their old position until they are united.

But though this operation has found favour with many experienced surgeons, and has largely supplanted that by posterior curved incision, it in its turn is likely to be abandoned in favour of the method by anterior incision. Having myself employed the latter almost exclusively for the last five or six years I am more and more inclined to prefer it to all other modes of excision, and shall now describe it in detail in the hope of inducing others to test its advantages.

The patient lies on his back with the limb as much extended as possible. A single straight incision is made from a point imme-

diately below the anterior superior spinous process of the ilium, downwards and slightly inwards for three or four inches. (Fig. VIII.). As the knife sinks into the limb it passes between the tensor vaginæ femoris and glutei muscles on the outside and the sartorius and rectus on the inside.

The lower inch or so of this cut should only divide the skin; the upper two-thirds should reach the neck of the femur at once. In this way the capsule is laid open vertically, and this opening can be enlarged by a little further dissection with the knife, care being taken, however, that the Y ligament is left as far as possible intact. The state of the joint having been now ascertained with the point of the index-finger a narrow-bladed saw is introduced along the latter and the neck of the femur is divided from above downwards. Then the head is extracted with a sequestrum forceps, and the acetabulum, if diseased, is carefully gouged out clean or scraped thoroughly with sharp spoons. Every trace of diseased synovial tissue discoverable is now removed with scissors,

Fig. IX.—Excision of Hip and Knee. 1. Anterior incision for removing the hip-joint (Hueter's and Parker's method). The incision runs downwards and a little inwards between the tensor vag. fem. (a) and glutei (b) externally and the sartorius (c), and rectus (d) internally. 2. Moreau's U-shaped incision for removing disease of the knee.

knife, and sharp spoon, special care being also taken to clear out any caseating abscesses communicating with the joint. All this should be done with as little violence to the tissues around as possible, so that none of the tubercular *débris* shall be forced into the fresh cut surfaces. When every portion of diseased tissue has been thoroughly removed, the cavity is freely flushed with our germicide solution until all loose particles have been washed away. It is then sponged dry from the bottom and is immediately dusted with iodoform, which may be carried further into the ramifications of the cavity on the end of the finger. It is well, I think, after this again to introduce a small sponge for the purpose not only of finally drying the part but also of wiping away any excess of iodoform which may be about. This sponge should be left in until the sutures which close the wound are in position and are ready to be tied. It is then removed and the

threads are knotted, a medium-sized drain-tube being carried down as far as the acetabulum. A thick dressing of salicylic wool, arranged in strips so that interstices are left into which serum can escape, completes the operation.

At first, I think the patient is much better without a splint of any kind. He simply lies on his back in bed with the limb fully extended by pulley and weight; indeed, the latter may often be dispensed with altogether. The first dressing may usually remain undisturbed for some days, after which it is well to replace the serum-soaked wool by a fresh dressing of the same kind.

Except for the drain opening such wounds heal, in my experience, as a rule by first intention. The fluid, moreover, after the first day or so, which comes from the drain-tube, is little more than thick odourless serum. It exudes in very small quantity and ought never to become truly purulent. This is the reason why the opening, although anterior, is perfectly adequate for the drainage of the cavity left by the operation. I have often been asked, "Do you find this anterior incision gives sufficient drainage for the discharges?" My answer always is, "Certainly, for there are no discharges worth mentioning after the first oozing of blood and serum immediately following operation." Those who ask this question have doubtless in their eye the older experiences of excision of the hip, when the operation was usually undertaken in an advanced stage of the disease, when suppuration had already set in freely with ramifying sinuses. I am not alluding to such cases, believing as I do that experience shows, and especially Mr. Marsh's figures alluded to already, that, beyond aseptic drainage, they are best left to Nature and are unsuitable for excision. But in relatively early cases treated carefully as just described we have usually, and ought always to have healing without suppuration at all properly so called. I could produce a series of cases illustrating this fact from my own practice and from that of my colleague Mr. Bilton Pollard, who operates on exactly the same lines at the Children's Hospital, and I believe other surgeons have found the same thing. It must not be forgotten that when an excision is performed early and all tuberculous tissue is removed, a clean-walled cavity is left, most of which is quite capable of healing by first intention, when its different surfaces are brought into contact by firm pressure. And in these cases, the head of the bone being removed and the acetabulum quite clean, the cut surface of the neck of the femur can be brought close up to the latter, so that although there is potentially a large space in the field of operation, there ought to be actually little or no cavity left if pressure have been properly applied from the first. There is no need then in such cases after the first day or so for extensive drainage, if the wound be kept aseptic. If it is not so, of course the case is totally different, and drainage is absolutely necessary. For my own part I intend to try whether some of these early excisions cannot be left to heal absolutely by first intention without any drainage at all, just as in many cases tubes can be dispensed with altogether in analogous cases of operation on the knee.

All that has just been said about the details of operation applies with equal force to that by external incision. But the anterior method has several advantages that cannot be claimed for the latter. In the first place not a single muscle fibre need be divided in the anterior operation and consequently none of the support of the muscles is lost to the joint. Nor are any vessels of importance divided if the deeper part of the incision be not carried too low in the thigh, and the same may be said of the nerves. Finally, the very fact of the wound into the joint being an anterior one enables us to place the patient on a double Thomas's splint a week or so after operation, and to keep him on this without any need to move the limb for as long a time as is desired. He can also now be placed for part of the day either on his face or his side for change, and this is usually very much appreciated. When supported with such a splint a patient can also be taken out of bed within ten days of the operation and can have all the benefits of the open air and change almost from the first. We are thus enabled to send our hospital patients home or to the country long before the wound is healed, and without risk, if ordinary care as to antiseptic dressing be observed. In this part of the treatment the iodoform emulsion will be found very valuable. A little of this fluid injected daily into the drain-tube will sink into all the deeper parts of the wound, whether it is filled with blood or serum, or even pus, by virtue of its high specific gravity, and will not only prevent or check the growth of pyogenic micrococci, but also arrest the development of any bacilli tuberculosis accidentally scattered through the wound by the

operation. If in the intervals between these injections the hip be kept well enveloped in salicylic wool there will be but little risk of septic infection. When a Thomas's splint is employed after excision of the hip it is well to have its rods made to diverge widely so that the affected limb shall be strongly abducted during convalescence. When the joint becomes firm in this position the effect is of course to cause tilting downwards of the pelvis on the affected side when the patient begins to walk. The result is that the limb is restored almost or completely to the same level as its fellow, and the actual shortening is compensated for.

The absolute rest secured to the hip-joint from the first by the treatment just described does for it what the plaster-of-Paris does for the knee. Not only does it save the patient from suffering, but it diminishes the hyperæmia about the joint, and thus in all probability reduces the risk of a local or general spread of the disease after operation. At the same time the patient can cease to be confined to bed the moment it is applied.

I had hoped, Sir, to be able to consider the application of the principles of treatment we have been discussing to the removal of tubercular disease from the elbow and shoulder joints; time fails me, however. But I trust that in what I have said, however imperfectly, I have justified the remark made in the first of these lectures—namely, that the excision of scrofulous or tubercular disease from a joint is no longer a mere mechanical problem; that it is no longer a mere question of removing a certain amount of dead or inflamed bone in the readiest manner, and drainage of the resulting wound until it heals. I hope that I have made good the claim of the operator in this field of surgery to be considered, not a mere skilful artificer, but a scientific worker, who brings a knowledge of anatomy, physiology, biology, and chemistry to a glorious task.

I trust, also, that what I have said may appear to others to justify that *hopefulness* as regards our future success in the struggle against tubercular disease which I feel myself. If the affection is parasitic, as no doubt it is, we may expect to check its spread in the future in ways never yet attempted, or, indeed, thought of. If the belief is warranted that tuberculosis is not inherited in the vast majority of cases, but acquired, how much more promising the outlook! If the disease be inoculable on any surface of the body, and if it is capable of being reinoculated from one part of an operation wound to another, we may hope to prevent its inroads by very simple precautions never taken before; and, when it has gained access to the body, and is making local ravages, our hopes of arresting them by operation are far greater now than heretofore. For now, relieved of the nightmare of the septic wound diseases, we can undertake operations at an early stage of the affection without fear, and remove all the local mischief without those wide-reaching resections of bone which brought shock and other attendant risks in their train; and we can do so with better prospects as regards the functions of the joint than formerly. The pain of the after-treatment has also been immensely reduced by the possibility with aseptic wounds of permanent dressings, and the patient may consequently be invited to face such an operation with far less fear than of old.

In conclusion, I should like to say that I have purposely abstained from troubling my audience by quoting either my own experiences or observations or the authorities in detail for all the observations alluded to in the course of these lectures. The subject is so large, and its literature so very extensive, that this would have been intolerably wearisome to you. I shall, however, append a list containing some of those sources of information which have appeared to me most reliable, on careful study, and to which reference can be made by those who desire to pursue the subject further.

I hope also before long to be able to collect a sufficiency of reliable statistics of recent experiences in this field of surgery to emphasise more fully those conclusions I have ventured to put forward, to which you have listened with so much forbearance.

SOME OF THE WORKS CONSULTED ON QUESTIONS RELATING TO THE SUBJECT OF THE ABOVE LECTURES.

Schüller, *Untersuchungen über die Entstehungen und Ursache der scrophulösen und tuberculösen Gelenkleiden*, Stuttgart, 1880; W. Cheyne, *Practitioner*, 1883; Baumgarten, *Centralblatt für die Med. Wissenschaften*, 1883; Baumgarten, *Zeitschrift f. Klin. Med.*, Bd. 9 and 10; E. Klebs, *Allgem. Pathologie*, Theil. I., 1887; Treves, *Holmes's System of Surgery*; Tscherning, *Fortsch. d. Med.*, Bd. 3, p. 65, 1885; Lehmann, *Deutsch. Med. Wochens.*, 1886, No. 9-13; Middeldorpf, *Fortsch. d. Med.*, 1886, Bd. 4, p. 249; Elsenberg, *Centralbl. f. Chir.*, 1887, pp. 52 and 651; Müller, *Fortsch. d.*

Med., 1886, p. 548; Jani, *Centralbl. f. Chir.*, 1886, p. 729; Kraske, *ibid.*, 1885, p. 809; Baug, *Fortsch. d. Med.*, 1885, p. 129; John, *ibid.*, p. 198; Wesener, *Fortsch. d. Med.*, 1886, p. 383; Wahl, *Deutsch. Med. Wochens.*, 1885; Klebs, *Virchow's Archiv.*, Bd. 49, p. 291; Weigert, *ibid.*, Bd. 88, p. 307; Stilling, *ibid.*, p. 111; Arnold, *ibid.*, p. 397; Leser, *Centralbl. f. Chir.*, 1888, No. 16; Koch, *Centralbl. f. Chir.*, 1884, p. 341; Pfeiffer, *Fortsch. d. Med.*, 1888, No. 1, p. 33; Langerhans, *Virchow's Archiv.*, Bd. 112, p. 16; Croft, *Clin. Soc. Transact.*, vol. xiv, p. 224; Marsh, *ibid.*; Korff, *Deutsch. Zeitsch. für Chir.*, 1885, p. 149; Willemer, *ibid.*, p. 268; Wartmann, *ibid.*, 1886; Sandler, *ibid.*, 1888, Heft 3 and 4; Walzberg & Riedel, *ibid.*, 1881, Heft 1 and 2; Caumont, *ibid.*, 1884, Heft 3 and 4; Gerster, *Annals of Surg.*, Ap., 1888; Lossen, *Hand. der allgem. und speciel. Pathologie und Chir.*, Pitha-Billroth, 1882, Bd. 2, Abtheil 2, Lief 4; Koenig, *Die Tuberculose der Knochen und Gelenke*, 1884; Leser, *Centralbl. f. Chir.*, 1888, and *Fortsch. der Med.*, Bd. V., p. 501; Grünfeld, *Zeitsch. für Heilkunde*, Bd. VIII., p. 191; *Centralbl. f. Chir.*, 1888.

Note.—A typographical error was overlooked in Lecture II, page 1263, by which 195 stands for 95 in Willemer's statistics (three lines from bottom of second column). These figures thus corrected show Willemer's statistics in the least favourable light. But if all cases treated by incision and drainage be included the total number rises to 128, making the mortality only 10 per cent., and if the cases treated by primary amputation be excluded the percentage of deaths further falls to 9.0.

REMARKS ON PAROXYSMAL SNEEZING.

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PART II.

THE intimate relation existing between intermittent sneezing and asthma has already been referred to, and we might narrate many cases in which the symptoms of both have been observed in the same person; but the following brief outline will serve equally well to illustrate the point. A patient for some years suffered from severe intermittent sneezing, which then became complicated with asthma, the asthma steadily increasing in severity, whilst the sneezing grew less and less, till at last it almost ceased. The asthma was of the peptic variety, and unassociated with bronchitis. Bed-dust always induced severe attacks, first of sneezing then of asthma. As bed-dust is insoluble, the part affected must have been either the mucous membrane or the terminations of the nerves, first of the mucous membrane of the nose, next of the lungs, whilst the change in the type of the disease from intermittent sneezing to well-marked peptic asthma favours the theory that the seat of the affection was in the nervous centres.

Our cases show that paroxysmal sneezing is related on one hand to bronchitic and peptic asthma, and on the other to hay fever. They are allied to the bronchitic form of asthma in being excited by dust, cold, and direct irritants, and to bronchitic asthma through those cases which commence with paroxysmal sneezing, and are subsequently complicated with bronchial asthma. To the peptic forms of asthma this paroxysmal sneezing is related through those cases in which the attack is excited by food.

In nearly all these cases, judging from the extent of the itching, a part or even the whole of the nasal passages is affected, and often the eyes, soft palate, and throat are also involved. In some instances, however, we have found that the nervous structures implicated are much more limited; indeed, the nose may altogether escape. In one very curious case the itching was entirely confined to the inner canthus of the eye, whilst in another it involved the whole of an eyeball.

The following series of cases occurring in the course of three generations of the same family serves to demonstrate the hereditary connection existing between intermittent sneezing and asthma.

The first member of the family, whom we will call the grandfather, was troubled with asthma for years, in fact, up to the time