joints is sometimes found to be grievously persistent, even with every care in diet and treatment. Occasionally we find such patients have been over-careful in their diet, and placed upon an inadequate quantity and inappropriate quality of food. There are too many strange and *doctrinaire* methods of diet enjoined in these days, and some of these, mostly imported from Germany on purely theoretical grounds, are found positively harmful. A better and more natural diet, with some good wine, is materially helpful in some of these cases, and brings relief and renewed health. Some of these polyarticular cases are sometimes regarded as rheumatic, and treated as such without any benefit. A recognition of the true nature of the ailment leads promptly to relief if appropriate treatment is prescribed.

Amongst cases in which recovery is apt to be retarded, and very tedious, are those of neuritis, a disorder which is apparently more frequently met with now than it was wont to be. It is a recognized sequel of influenza, and is one of the ailments that is apt to depend on gouty disturbance. In elderly people it is especially apt to linger, wearing out the powers of the body, and leading to intense suffering, muscular and other trophic (wasting) changes in the part affected. Post-zonal neuritis well illustrates what I refer to, and is a sore calamity sometimes in elderly patients. Many months may elapse before relief comes. Sciatica is another example. Treatment of every kind appears in some of these instances to be quite unavailing, and one hardly knows how these ailments cease at last to vex the patient.

You will have observed that I have not been discussing the course of maladies essentially chronic. These are indeed tedious. I have referred to a continuous and protracted course of acute ailments, so that the point of recovery is not yet reached. An acute disease may sometimes subside, but the patient is left with feeble recuperative power, so that he cannot readily be restored to sound health. He may never subsequently reach the measure of full vigour he once enjoyed.

I have already indicated the importance of occasional recasting of the diagnosis in any protracted case of disease, a point carefully urged by Sir James Paget in his teaching. This procedure will sometimes set us on the right track for successful treatment. There are cases of retarded recovery which can promptly be benefited only by securing a fresh and thorough change of environment. You move such a patient from a sick room in a crowded city and place him in fresh country air, and immediate progress is witnessed. There are many houses everywhere where there are some unwholesome and insanitary influences at work which suffice to retard recovery; influences, perhaps, not readily detectable, but you do well to urge removal of the patient, if possible. In the course of many ailments of children who continue to be languid and feverish when no obvious signs of disease can be found—for example, after an attack of measles—such a change is found to be most valuable, and to act favourably when tonics and good diet have made but little impression. Similar benefit is to be gained in many ailments of a surgical nature, but it is not my business to refer to them. I think, too, that gynaecologists could tell of like advantages to be gained in this way.

In any case of lingering illness we shall do well to try and discover any personal peculiarities in the patient—to bear in mind the personal factor, so often disregarded at the bedside. We shall be wise, too, if we remember the remark of a sagacious physician—to the effect that “each patient convalesces according to the nature of his constitutional diathesis.”

At a meeting of the British Balneological and Climatological Society on June 11th the following were appointed officers for the ensuing session: Dr. Leonard Williams, President; Dr. A. F. Street, Chairman of Council; Dr. R. Fortescue Fox, Hon. Treasurer; Dr. Harry Campbell, Librarian; Drs. Septimus Sunderland and F. A. de T. Mouillot, Hon. Secretaries; twelve Vice-Presidents and thirty Members of Council were also elected. On the same occasion it was resolved that next October the Society shall become a section of the Royal Society of Medicine. The annual dinner was held the same evening at the Piccadilly Restaurant, one of the guests being Sir James Barr, who in the afternoon had delivered an address on the peripheral circulation and its treatment.

An Address

ON THE

SURGICAL TREATMENT OF THE RHEUMATOID GROUP OF JOINT AFFECTIONS.*

BY

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OF late years our views of the rheumatoid group of diseases have undergone a welcome change. The investigations of Strangeways, Goldthwaite, Painter, Still, Andrews, Hoke, and others, have helped materially our classification, and the terms “rheumatism” and “rheumatoid arthritis” have not their former diagnostic value. The knowledge we now possess enables us to distinguish certain types so different in character as practically to constitute distinct diseases—distinct from the clinical side as well as from that of the pathological.

Although perhaps needing some further revision, the classification of Goldthwaite is distinctly helpful. He recognizes five types:

- (a) Villous arthritis.
- (b) Hypertrophic arthritis.
- (c) Atrophic arthritis.
- (d) Septic arthritis.
- (e) Chronic gout.

The medical treatment of these conditions is an ever-discussed problem, and great strides have quite lately been made in our dealings with the atrophic variety by the recognition of its autotoxaemic origin. On this occasion, however, I will refer only to the surgical treatment of the group, because it has been much overlooked by surgeons and bears but a scanty record in our literature. There is no class of disease in which less attempt is made either to prevent or to correct deformity. Knees and hips flexed, wrists in useless postures, elbows of no service to the hands—these are almost a routine result of either the atrophic or hypertrophic attack. Physicians are content if the patient is comparatively free from pain, and the deformities are looked upon as an essential and permanent phase of the disease. In the early stages the practitioner has great opportunities. It is for him to discover whether an infective or toxaemic focus exists in nose, teeth, pharynx or intestinal tract. I have seen it in connexion with middle-ear disease, with chronic abscess of the antrum, and with ozaena, and the general condition has responded to local treatment. Andrews and Hoke, of Atlanta city, have shown the direct relationship of arthritis deformans to albuminous putrefaction in the intestinal tract, and therefore how necessary it is to decrease the supply of albuminoids or to prevent their putrefaction. These are all encouraging lines of research which may ultimately deprive these diseases of their terrors, but for the present there is ample necessity for direct surgical intervention, mainly of an operative type.

VILLOUS ARTHRITIS OF THE KNEE.

We all know well a type of disease in the knee, very commonly associated with flat-foot; it has been called villous arthritis. The range of movement is usually good. There is no general rigidity, but sometimes considerable pain when an attempt is made to flex the limb completely. There is a creaking on movement which differs from that of osteo-arthritis as much as it does from that of tenosynovitis. It is not so coarse as the one nor so fine as the other. There is usually pain on pressure over the internal lateral ligament.

Accompanying this form of trouble there are no constitutional symptoms. It is due to a congested and relaxed condition of the synovial membrane, which becomes thrown into folds, especially at its reflections at the edges of the cartilage. There is nearly always some little fluid found in the joint, which varies in quantity and at times quite disappears. Prolonged friction invariably intensifies symptoms, and pain is complained of, accompanied by stiffness. In a certain variety a marked thickening is

* Delivered before the Halifax Medical Society.

noted behind the ligament of the patella, and after walking pain is complained of: on squeezing this lump. In more advanced cases the contour of the joint is lost and the pouches denote a thickening of the synovial membrane. Sometimes locking of the joint due to synovial fringes occurs. Such a knee has also been called the "chronic rheumatic knee," and at times "recurrent traumatic arthritis." The changes in such a knee are not symptomatic of any general condition and are really due to trauma—a simple sprain, deflection of body weight as in flat-foot, or to a direct blow. It can always be cut short in its early stages by limiting function and giving rest. Its development is always the direct result of friction. If destruction of the membrane has gone far and the villi have become obstructive, then only operative measures will prevail. It is well to take an x-ray photograph to see if any bony excrescences have formed or if a fibrous enlargement exists behind the patella. Distension of the joint with oxygen will render the picture on the plate much more instructive, but this must be done with scrupulous care. The sterile needle should be passed behind the patella and its end made to move freely when within the joint to ensure that the oxygen does not enter a vein.

In such a type of case it is often necessary to operate. An incision is made on the more painful side of the joint, generally the inner, and the interior is explored. In the early stages of trouble a slightly oedematous and congested condition of the synovial membrane is found, with reduplication at the cartilaginous edges. In other cases the synovial membrane has been transformed into a mass of short villi, and if traced into the pouches below the vastus, oedematous masses of synovial folds almost gelatinous in appearance present. In other instances long pendulous fringes with fatty extremities float about, and a few loose fibrous bodies are seen. In rarer instances, as soon as the joint is opened, a congested mass of long villi, resembling a fine variety of seaweed, brown or reddish-brown in colour, blocks the wound up. Whatever the variety we meet with, a pair of long curved scissors is introduced into the joint and all synovial excrescences are cut away. This is tedious and difficult, and thorough care should be taken to free the articular surfaces from invasion. An incision should then be made on the outer side of the knee and the clearing process repeated.

The variety to which the term "recurrent traumatic arthritis" is best applied is very interesting. It is that form characterized by a thickening behind the patella tendon. When the joint is explored the adipose mass with which the ligamentum mucosum and alaria are connected is found reddened, thickened, and oedematous. It should be removed in its entirety with any masses which may be encountered. On cutting through this several small haemorrhages will be found, representing separate injuries, probably the cause of the recurrent effusions. Personally, I do not drain the joints, but fix a cage on them, allowing of limited movement in from fourteen to twenty-one days. Such cases often make remarkable recoveries, and do not display the tendency to recur which might be expected.

ATROPHIC ARTHRITIS.

Atrophic arthritis, which used to be called "rheumatoid arthritis," as opposed to hypertrophic or osteo-arthritis, is perhaps the most crippling of all the varieties. It is the least amenable to surgical intervention, but will, doubtless, in future be a more docile disease in the hands of the physician, who should from the first recognize that the deformities of the limbs may be prevented by simple mechanical devices, and this is most important, especially in the knees. The symptoms of this affliction are, briefly, thickening of the periarticular structures and effusion within the joints. It begins usually in the fingers—spindle-shaped swellings affecting the first row of phalanges. The whole of the joints may become affected. A radiograph throws much light on the condition; the bones of the hand are thinned, and sometimes telescopic; the absence of cartilage between the bones, together with a general joint atrophy, are very characteristic.

In certain cases the atrophic variety will apparently remain quiescent, leaving certain joints free, or but slightly affected. I have in my mind one such case, which I will relate:

Sixteen years ago the late Dr. Cameron, of Liverpool, asked me to help in the case of a young lady of 21. Her hands were

partially affected; the hips were free, but the knees had for some years been acutely flexed. They were bound down by firm fibrous ankylosis, which resisted for a time all attempts at extension. After three months of very painful traction and straightening with manipulation under anaesthesia, the knees became straight, and walking was painfully persevered with for three years. I then opened the joints, denuded them of cartilage, and brought about a bony ankylosis. I saw her twelve months ago, eleven years after the operation, and she can walk for miles, and there has been no further involvement of joints.

ARTHRITIS OF THE WRIST.

Never let the arthritic wrist, septic or tuberculous, ankylose in a position of flexion. If ankylosis is to take place, see that it does so in the fully extended position. The power of grasp is lost when the wrist is flexed, and it therefore becomes a paramount necessity that no mechanical obstacle should be placed upon rigid fingers.

HYPERTROPHIC ARTHRITIS.

The hypertrophic variety is known to us all, and time will allow me to refer only to its more local manifestations. These we can best study in the knee and hip. The condition often affects one or both knees, and may show no tendency to spread to other joints. There is a limitation of movement, some effusion in the joint, coarse creaking and a fullness around the patella a little later, and any attempt to fully extend the joint is painful.

The x ray shows considerable lipping, evident early along the edges of the tibia and on the bony edges of the femoral condyles adjacent to the cartilage. It is also seen along the edges of the patella. Such cases, both at the hip and knee, are generally handed over to the masseur or to an institute for baths and electricity. Clinical evidence, however, is overwhelming that friction of joint surfaces in the hypertrophic form of arthritis is a factor to be scrupulously avoided. Any treatment which ignores this is faulty. When knees or hips become ankylosed in the course of the disease, as sometimes happens, pain disappears; and when this occurs we usually find the deformity so pronounced as to cripple the patient completely. In knee and hip the extremes of flexion and of extension are most harmful. The motion between these extremes is often quite free and painless. The essential element of treatment is to affix a splint so constructed that it will only allow the joint to move in its painless range. In the knee this is often most efficacious, and I generally apply a cage, such as is used for a slipping semilunar cartilage, and have it so locked that it will not allow the knee to straighten within 15° or 20°, nor will it allow of more than 50° or 60° of motion. In many cases it has been possible to restore such cases either to a full or to a more extended range of movement. In extreme cases of osteo-arthritis of the knee, where flexion is pronounced and walking difficult, the joints may with advantage be ankylosed. Exploration of the joints with a view to clipping bony prominences in order to obtain a movable joint is, in my experience, useless.

Perhaps the most generally sad and anxious cases which come before the practitioner are the painful hips of middle life and later. They are due to a hypertrophic form of arthritis, which when it occurs in the old is called "malum coxa senilis." The head of the femur becomes changed in shape, flattened, and at the femoral and acetabular margins masses of bone are segregated. In the same way the edges of the acetabulum are surrounded with irregular heaped up lumps of bony tissue. The lesion is progressive and its rate of progress is largely influenced by the degree of friction imposed. Clinically, I know that if taken early and placed in a splint, many such cases with stiffened hip make excellent recoveries. Such treatment generally involves four months in bed and fixation for three months longer. In the later stages where flexion has become more pronounced there is a distinct risk in even slowly attempting to rectify the deformity mechanically. In a patient who suffers from this type of disease forcible manipulation is quite unjustifiable. I never do more than place him on his back, bandage the limb to a splint and let gravity undo the flexion. The trouble is, however, that in many cases abdominal symptoms supervene. The patients complain of pain, present abdominal distension, hiccough, even become collapsed. I have met with a disaster in the shape of death, and in three other cases patients have been critically ill. In such cases, when the pain has been unendurable, I have removed the head and

neck of the femur, and sometimes the trochanter, with satisfactory results.

PSEUDARTHROSIS WITHOUT DISARTICULATION.

One cannot help, however, being impressed by the shock which a disarticulation produces, and I have long felt that if it were possible to produce a pseudarthrosis without disarticulating the head a great gain would be accomplished. I advised, therefore, and have several times practised, an operation having this end in view. It consists in cutting the great trochanter from the femur

Fig. 1.

with its muscular attachment, removing the neck of the femur and screwing or nailing the trochanter over the acetabulum, which contains the severed femoral head. This is to avoid callus exudation, which might bring about union. It is performed in this way: A longitudinal incision is made about 6 in. in length with the upper border of the trochanter in its centre. An incision is made across the base of the trochanter just below the insertion of the gluteal muscle. A slice of the trochanter from this point to its junction with the neck

Fig. 3.

above is sawn or separated by a very wide osteotome, and retracted upwards. The capsule is now opened and the head separated from the neck with an osteotome (Fig. 1). Extension is next put on the femur, and the trochanter with its muscles attached is screwed on to the head of the femur, which remains in the acetabulum (Fig. 2). Deep and superficial sutures complete the operation. If the joint is tender it is better, to avoid impinging, to remove a portion of the neck. In an ankylosed sound joint following sepsis it may be advisable, instead of dividing the neck near the acetabulum, to divide it near the trochanter. I commend this operation as very suitable for those advancing in years. It saves the shock of disarticulation—an

all-important consideration.

In bony ankylosis, where disarticulation has to be made with a chisel, the time saved is great and the result is more reliable than where a flap of tissue intervenes, unless the piece of bone removed is considerable, while the removal of much bone involves the sacrifice of muscle and of some control of movement. The femur remaining is well supplied with

muscles for useful movement, and no stitching of capsule is needed for the prevention of displacement upwards.

The object of the operation is to bring about movement without involving the head of the femur, as we may be sure that function is the factor which produces all the trouble. If the joint should become ankylosed the pain disappears. Recognizing this fact, Albee of New York has devised a simple operation with the object of ankylosing the hip.

He chose for his first operation a big, muscular man weighing 185 lb., with a practical shortening of 2½ in., with marked flexion and adduction. Albee made an incision down the front of the joint along the inner edge of the sartorius. Coming down upon the head of the femur, he removed without disarticulation half the upper hemisphere with a large chisel through a plane nearly parallel to the long axis of the neck of

the femur. With the same instrument the acetabulum was transformed into a flat-surfaced roof, against which the bared surface of the femoral head was wedged by keeping the limb well abducted. To procure this abduction it was necessary to divide the adductors (Figs. 3 and 4).

The advantage of this operation is obvious, as it practically involves no shock—an important point in old folk. The difficulty often is to understand how flexion is to be governed. There are many cases, as we quite well know, in which no reasonable amount of mechanical force, even if the adductors be divided, will prove sufficient to extend the limb. In such cases it would be manifestly better to fix the hip without regard to the deformity.

SEPTIC ARTHRITIS.

It is, however, when we come to the septic type of joint trouble that so much may be done to mitigate its miseries; so often this condition ends in ankylosis, usually with great deformity. In the case of the knee, we are often asked if movement can be secured without an operation.

If the disease has been severe, and there has been loss of bone, and the ankylosis seems firmly fibrous, no effort should be made to disturb the union. If there is already a little motion, which is easy and smooth within its limits, and the x ray confirms our conclusion that the destruction has been but slight, the experiment may be made. Any attempt to anaesthetize such a patient and to move his knee forcibly would be disastrous. Passive movements and massage would be only a degree less hazardous. The safe procedure is based on the clinical knowledge that every attempt at stretching a stiff joint due to arthritis is followed by a varying degree of reaction. In the case of ordinary periarticular adhesions, either capsular or extracapsular, such reaction is of no great account, and we ruthlessly break such adhesions, and follow this up with massage and exercise. If the stiffness is due to changes in the synovial membrane, the cartilage, or the bone, the greatest care is needed. Given a case, then, which has run a non-destructive course, and which possesses, say, 20° of movement, we mould an angular splint of 30°, and lightly bandage the limb to it. In a day or two we shall

Fig. 2.

Fig. 4.

have increased the flexion of the knee from 20° to 30°, and the knee should be kept for a week or so resting in its new position. The splint should then be removed for certain hours, and if in a few days the patient has made a permanent gain of 10° and possesses a range of 30° instead of that of 20°, we can proceed on similar lines to the acquisition of more. By this experiment we first of all stretch tissues, and by resting the limb we combat the reaction. The recognition of this principle, which is not referred to in textbooks, is of great practical value. So often cases come before us of whose early history we know nothing; the knees are stiff, or nearly so, and the patients clamour for movement. By this graduated scheme we can find out without injury whether a mobile joint is procurable or not.

In firm fibrous or bony ankylosis of the knee, with or without lateral deviation, the operation of choice is the removal of a wedge so shaped that most of it is derived from the femur, and only enough removed to bring the tibia into correct apposition with the femur, the limb being in a perfectly straight line. If this be accurately done, the subsequent treatment is easy, as the bones remain in excellent apposition with but little extraneous support.

I make a V-shaped incision over the joint. The knife is entered at a point about 4 in. above and 1 in. behind

Fig. 5.

the adductor tubercle, and it is prolonged downwards in a straight line till the upper margin of the tubercle of the tibia is reached. The incision is here brought horizontally across the front of the limb, and then curved upwards on the outer side of the joint to a corresponding point to that on the inner side. If one decides to utilize the patella, the original incision is carried straightway through the infrapatellar tendon, and the whole flap, including the patella, is turned up. The articular surface of the patella may be adherent to that of the femur, and in this case it must be detached with a chisel. I now proceed to remove a small wedge, mainly from the femur, extending only four-fifths through the thickness of the bone (Fig. 5). This enables me to flex the joint acutely by fracture, as it is not advisable—indeed, it is exceedingly dangerous—to attempt to saw completely through the bone. Often there is a displacement backwards of the tibia, and if an attempt be made to saw right through the bone the popliteal vessels are in jeopardy. This accident has occurred to very careful surgeons. It can always be avoided by making the apex of the sawn edges converge half an inch or more in front of the posterior surface of the bone. The joint is now completely flexed

Fig. 6.

and the fractured portions of bone are trimmed by saw or chisel (Fig. 6). In removing the wedge it is essential to remove as little bone as possible from the tibia, a thin slice at right angles to the shaft being all that is required.

It is best not to remove too much bone from the femur at one saw cut, but rather to take away thin slices to enable one to see that the juxtaposition of the two sawn surfaces is perfect. This perfect apposition is very necessary, as it lightens responsibility in after-treatment, there being little or no tendency for malposition to occur. If too much bone is removed anteriorly, genu recurvatum and stretching of the popliteal vessels results; if the apposition is deficient posteriorly, the pedestal of support is weakened and again the vessels are strained.

If there has been acute flexion, it is often well, after removing all the bone necessary to restoration of symmetry, to keep the limb for the first few days slightly flexed in order to avoid strain on the popliteal vessels. Apparently, very slight stretching will produce serious

trophic disturbance. If the patella is utilized, a thin section of bone is removed from its articular surface, and a portion of the anterior surfaces of femur and tibia is prepared for its reception. Cases in which both hips are ankylosed, and in addition flexed and adducted, often occur. It may then be necessary on the one side to perform osteotomy, and on the other pseudarthrosis. The favourite operation is known as Gant's osteotomy, which involves section below the lesser trochanter. Although in Gant's operation the section cannot be interfered with by the shortened psoas and iliacus, I have found that in cases of right-angled deformity of the hip the upper part of the femur left fixed after Gant's incision has an ugly way of encroaching upon Scarpa's triangle.

With a view of not merely rectifying a flexion angle which has been the generally ascribed object of a femoral osteotomy, but with the intention of lessening or obliterating adduction with pelvic tilting (Fig. 7), I make my incision obliquely through or by the side of the great trochanter. This often involved hard work because of the thickness and sclerosed condition of the bone. The work is much facilitated by having a small knob on the end of the saw, such as one which Weiss has made for me (Fig. 8). One can saw through the bone with much energy when there is no danger of either transfixion or of losing one's place. It

Fig. 8.

is better, where practicable, to saw completely through the bone rather than a certain distance, and I prefer going through the trochanter because of extra callus exudation, as an ununited fracture will frustrate the object of the operation. The adductors are next subcutaneously divided, and, in the case of youth or adult, traction is applied by means of pulleys. Very often 1 in. or 1½ in. may be gained by this traction, and in this way some of the shortening of actual displacement may be combated. The leg, still fully extended, is placed in a position of abduction, which varies with the degree of pelvic tilting (Fig. 7). The greater the tilting the greater the abduction should be. The pelvis on the sound side is fixed and the abduction splint is applied, and extension and abduction are maintained. Seven or eight weeks are allowed to elapse—until, in fact, bony union is completed with the limb in abduction and at an angle with the body (Fig. 7).

It is now to be noted that the length of the limbs may be equalized in one of two ways, or by a combination of both ways—either by lessening the practical length of the sound limb, or by increasing that of the short one. By osteotomy and extension the leg is actually lengthened, and by the osseous union of the femur in abduction with the pelvis the elevation of the pelvis on the opposite side is effected. With an out-stretched thigh in one piece with the trunk it is clear that the limb can only be adducted at the cost of elevating the pelvis on the sound side, and in this way several inches of shortening may be remedied.

Fig. 9.

PSEUDARTHROSIS BY OPERATIVE PROCEDURES.

Surgeons have for nearly one hundred years endeavoured to bring about the formation of movable in the place of fixed joints. Barton of Philadelphia first endeavoured to overcome flexion of the hip by means of osteotomy, and tried to avoid union of the fragments by passive movements. Similar efforts were made in the temporo-maxillary joint by division or removal of bone and the interposition of foreign bodies. Gluck of Berlin, over twenty years ago, with great ingenuity introduced various ivory joints after removal of diseased ones, and some patients retained these foreign bodies for many months; ultimately, however, they suffered extrusion. I have on nearly seventy occasions, with varying success, endeavoured to bring about movement in ankylosed hips, mainly by removal of the head, neck, and trochanter, by interposition of foreign bodies between the acetabulum and shaft, and later by the method I described when dealing with rheumatoid arthritis of the hip—*malus coxae senile*.

In 1895 and following years, after exsection of the neck of the femur and sometimes the neck and trochanter, I surrounded one or both ends of the bone with gold foil, in order to prevent adhesion of the surfaces. Whatever available soft structure I could safely interpose (and this was generally muscle), I did, and in a certain proportion of cases very gratifying results were obtained. In some, however—generally in those cases in which little bone was removed—stiffness resulted. In others the joint remained too flail-like for serious work, but in practically all great improvement on the original condition was obtained. Few cases so operated upon complained of serious pain, but often of an aching which only occurred at intervals. Where much bone was removed, the walk sometimes resembled that of congenital dislocation, but in no instance did I observe the development of lordosis. In later operations I confined myself to removal of the upper part of the femur, sometimes including the trochanter, and added the interposition of muscular tissue alone, such as was described later by Nélaton. Since then my results have been more uniformly reliable.

The idea of interposing hyaline cartilage or imitation of normal joint surfaces originated with Weglowski, and was employed by Lexer, who, in a case of synostosis of the elbow after the removal of superfluous bone, took two pieces of cartilage from the sixth and seventh ribs, and interposed them in such a manner that the perichondrium came in contact with the raw surface of the humerus. The patient died in a few weeks from pneumonia. When the joint was investigated, it was seen that the perichondrial side of the cartilage discs had become firmly attached to the humerus. At the margins the cartilage decreased, to merge without distinct boundaries with the surface of the bone. The functional result was also promising, as the patient could flex and extend his joint 60° without interfering with supination or pronation. This represented the interposition of cartilage after the removal of half, not the whole, joint.

Murphy of Chicago, in a most interesting communication, advocates the interposition of a pad of fat and fascia, and has reported some interesting results. He argues that fat tissue easily changes to connective tissue, and that hygromata or bursae are the result of a degenerative or absorptive process in fatty tissue with hyperplasia of the connective tissue element. The fluid in the centre is the liquefaction of hypertrophied connective tissue. These views he utilizes in his efforts to produce movable joints, and he lays down the law that the aponeurosis used in the construction of artificial joints should have in it a considerable quantity of fatty tissue, which, when subjected to pressure, forms a bursa to take the place of a synovial membrane. We know that in old ununited fractures in the shafts of the long bones the presence of the false joint or interosseous sac is evidence of this pathological condition, and it is still further borne out by a series of experiments performed on animals. One of Murphy's experiments may be related.

The cartilage was removed from the head of the femur of a big dog and the acetabulum gouged down to the bone. A large flap of fascia lata, including fat, was sutured round the neck of the femur so that the muscular surface of the fascia lined the inner surface of the acetabulum. The dog was killed in four months, and passive movement was found to be free in all directions. On dissecting the joint there was revealed, inter-

posed between the upper extremity of the femur and the acetabulum, a small sac with a smooth lining. It contained some slightly turbid sticky fluid. Its total surface was about that of the normal acetabulum cavity. The end of the shaft of the femur where the cartilage had been removed was covered by the newly-formed synovial endothelial lined membrane. Sections from the sac wall showed on the inner surface a well-formed endothelial lining.

Many years ago in an adult I cut down upon a dislocated hip of two years' standing which had given rise to serious inconvenience. My motive was to remove the head and as much of the neck of the femur as possible consistently with the least possible interference with muscular attachment. On separating the head of the femur from its surroundings I found an admirable attempt at a socket and a plentiful smooth hyperplasia of connective tissue which closely resembled a bursa. Murphy, recognizing this fact, experimentally has operated upon several joints with a varying amount of success. Perhaps the most successful is that in which the radiographs show an ankylosed hip indirectly due to a gunshot wound. The head has been gouged out of the acetabulum by a curved joiner's chisel so directed as to follow the contour of the acetabulum. After displacing the trochanter a flap of fascia lata was drawn down under the head of the femur, which was chiselled and curetted to make it look as normal as possible, and carefully fitted into the acetabulum cavity to form a complete lining for it. The under surface of the flap, $\frac{1}{2}$ in. from the edge, was sutured to the joint capsule around the acetabular margin with interrupted catgut sutures to secure it and prevent its displacement subsequently. The result of this case was most encouraging, as Dr. Murphy tells us that the motion in the hip is normal and free.

These fascial flap operations are available in the case of the lower jaw, hip, shoulder, elbow, and knee. Although as early as 1895 I had interposed flaps in an endeavour to produce movement in old ankylosed hips, to Murphy undoubtedly belongs the credit of first making an attempt at the restoration of a joint which should approach the normal in appearance and function, and of drawing attention to the value of flap and fascia as a lining to a joint because of its hygomatous transformation. Murphy first performed his operation in 1901. His operation, however, must have only a very limited scope, for it is rare, in cases in which bony ankylosis has resulted, to find hips which can be whittled into shape. The head is usually absorbed and the neck has travelled a varying distance above the acetabulum. The difficulty of bringing such femora, excepting in the case of children, into an approximately normal position, is often quite insurmountable, while to retain them there would be beyond our power. In quite a number of cases the neck is ankylosed to the ilium two or three inches above the joint, and I know from experience that the application of pulleys will make no appreciable difference in the length of such limbs.

Such cases demand the free removal of bone, as in the following case:

A lady, 36 years old, was afflicted with a shortened, painful, flexed, and adducted hip representing about 6 in. of practical shortening.

The first operation performed was a transtrochanteric osteotomy, and the limb was placed, as I have before explained, in an abducted position. In this way I was able to reduce the practical shortening to 2 in. by correcting the pelvic obliquity.

The second operation took place twelve months later, and consisted in removing part of the trochanter and neck and interposing a muscular flap. She was able to get on to a pony a month after operation, on a hunter in six weeks, and took a jump in the seventh week. She is on her feet most of the day, rides often, and can walk long distances. Such results are possible, provided care be taken to avoid bony union.

I may be allowed to relate a case which should encourage us in a more radical plan of campaign. It belonged to a group of infective disease, often called chronic rheumatism.

A woman, aged 30, presented two acutely flexed hips and knees, and one ankle in bony fixation. The joints stiffened with very acute symptoms following typhoid fever. When I saw her some five years later the left hip lay upon the abdomen bound down by fibrous ankylosis, the right was ankylosed with 90° of flexion. Both knees were badly flexed and fixed, while the left ankle, synostosed in extreme equino-varus, looked glazed. No attempt at walking was made, even by the aid of crutches.

Within four months I operated upon her five times. The bony ankylosed ankle was first straightened by the removal of a large wedge with its base obliquely outwards. Next a wedge was removed from the left knee; then pseudarthrosis of the left hip by removal of trochanter and neck and muscular interposition was performed. The right knee was next straightened by a similar operation to that performed on the other knee, and finally a transtrochanteric osteotomy of the right femur completed the scheme.

All the wounds healed by primary union, and in less than six months after the last operation the patient was walking short distances painlessly, only aided by two sticks.

I mention such cases in order that it may be realized that it is a mistake to strike a minor key. The weakest of such cripples—rejected, helpless, and hopeless—seem to be specially endowed with strength when they see salvation at hand.

There is still another operation to which I would draw attention, and that is the transplantation of whole joints in the place of exsected and diseased ones. Only a few months have passed since this operation was performed, and, as we know in the case of Gluck's ivory joints, some of which remained *in situ* for over twelve months and subsequently become extruded, it is necessary to withhold our judgement. The experiment is extremely interesting, and is an eloquent tribute to surgical ambition. Already this operation has been performed on five or six occasions, and I will describe the transposition by Lexer of a complete knee-joint.

The patient, a girl aged 18 years, was the subject of ankylosis of the knee, the result of a purulent osteomyelitis of the femur. The joint was acutely flexed. An anterior flap incision was adopted with its base above the femoral condyles and its lower border below the tuberosity of the tibia. The flap included all the soft parts—the detached ligament of the patella, the remainder of the joint capsule, and the ligament, as well as the muscular attachments. The patella which was chiselled from the femur formed also part of the flap. All lateral and posterior attachments were carefully removed from the bone, and remained in their entirety attached to the popliteal structures. Simultaneously an amputation was performed through the thigh in a patient suffering from senile gangrene. The knee-joint, including the semilunar cartilages, the epiphyses, and the crucial ligaments was removed from the amputated limb and transplanted into the gap formed by the exsection of the girl's knee. Some trimming was necessary to make the parts fit, and the ligament of the patella was fixed to the tubercle of the tibia. The femoral and tibial epiphyseal portions were fixed by nails. Lexer, however, omitted to cover the new patellar surfaces which become united with the femur; months later it was necessary to cut down and remove the patella. This gave an opportunity for the examination of the epiphyses, which were found firmly united. The union was so complete that it did not allow a trace of motion. The semilunar cartilage and crucial ligaments were preserved; the articular cartilages were smooth without fibrillation. Around the joint a connective tissue callus had formed, containing the remains of ligaments and capsule, as well as tendons. The question naturally arose, Had the joint obtained life? A spicule of bone was removed containing a piece of cartilage, the spongy portion of the epiphysis, and the connexion of this with the old tibia, and on the outside the periosteal covering of the transplanted bone. Microscopic examination revealed firm fibrous and bony union, also new vessels and bone lamellae in the medullary spaces.

In another case the upper third of the tibia was exsected for an endosteal sarcoma and a transplantation made to fit the gap. Union occurred here also.

It is premature to discuss the subsequent history at so short a date. It may be mentioned, however, that both limbs could bear the weight of the body during standing and walking.

It will be of interest to watch the later progress of these and similar cases and to study the physiological questions involved. Can a joint transplanted live indefinitely, perform its natural functions, and alter so little in form and structure as to adapt itself to weight and function?

By the death of Miss Mary Hezmalhalch, of Felliscliffe, Yorkshire, certain dispositions in the will of her brother Joseph, who died some thirteen years ago, have now become operative. The Harrogate Bath Hospital, the Yorkshire Deaf and Dumb Institution, the Leeds Deaf and Dumb Institution, and the Harrogate Cottage Hospital each receive a sum of £1,000, and the Leeds Hospital for Women and Children half that sum. The principal beneficiaries, however, are Leeds Infirmary and Leeds Dispensary. The former receives three-fourths of the residue of the estate, and the latter the remainder. Such residue seems likely to amount to a sum of over £25,000.

A Clinical Lecture ON ARTHROTOMY OF THE KNEE

FOR THE

REMOVAL OF INFLAMED SYNOVIAL FRINGES
AND OF THE PADS OF MALGAIGNE.

DELIVERED AT ST. BARTHOLOMEW'S HOSPITAL.

By C. B. LOCKWOOD, F.R.C.S.,

SURGEON TO THE HOSPITAL.

My lecture to-day is based upon operations performed for the removal of inflamed synovial fringes from the knee joint and of certain pads of fat, which have hitherto received little attention. Ordinary cases of slipped, dislocated, or broken fibro-cartilages will not be referred to. I cannot help regretting that, owing to the calls upon my time, I have been unable to read the later literature on the subject, and therefore my remarks will be founded upon my own experience, which, after all, is for you the best and most instructive.

I advise you to be very cautious in making statements as to what you think has happened within an injured knee, but this advice, of course, applies to everything you are unable to see. As a rule, inflamed and enlarged synovial fringes are mistaken for some fault in the fibro-cartilages or for a loose body within the joint. The reasons for this are that clinically there is a close resemblance. The enlarged synovial fringes are apt to get between the articular surfaces and trip the patient up, and, moreover, as you are aware, a slipped, dislocated, or broken fibro-cartilage is usually associated with pain at the inner or outer side of the knee, and pressure over the inner or outer fibro-cartilage is accompanied by tenderness. When you remember how close the ligamentum alaria, usually at fault, are to the fibro-cartilages, it is easy to understand that pain or tenderness felt in them is usually attributed to the former, but, as a rule, the situation and extent of the tenderness ought to put you on your guard. The pain and tenderness of inflamed alaral fringes is usually felt close to the edge of the ligamentum patellae. The following is a case in point:

A middle-aged gentleman, who, by-the-by, was very gouty, was sent with the usual history of having dislocated his internal semilunar fibro-cartilage. But pressure on the edge of the fibro-cartilage in front of the internal lateral ligament failed to elicit the usual pain or tenderness. On the other hand, rather acute pain and tenderness were to be found internal to the ligamentum patellae and in the situation of the internal alaral ligament. There was, moreover, a slight swelling at that spot. When the joint was opened by an internal vertical incision, the internal alaral ligament was found to be inflamed, swollen, and elongated, and situated between the internal condyle of the femur and the tibia, so that it could be easily squeezed. This explained the pain which the patient felt when he extended the tibia on the femur, and which entirely disappeared after removal of the inflamed fringes and of some of the fat. One would prefer not to perform arthrotomy upon gouty patients, but in this instance the pain and discomfort were spoiling the patient's life and preventing him from doing many things which he wished to do.

The following is an instance in which inflamed synovial fringes were mistaken for a loose body in the knee-joint: A footman was suddenly tripped up by something within the knee-joint. This occurred more than once, and ended in him falling downstairs whilst carrying a tray. When he first came under observation he had synovitis of the knee, with a moderate amount of fluid in the joint. He gave a most graphic account of a loose body which could be felt sometimes at the inner and sometimes at the outer side of the knee, and before the operation this is said to have been felt by the House-Surgeon and others. However, when the joint was opened, some fluid escaped, and although the joint, and all its pouches, was explored over and over again with a bullet scoop, no loose body could be discovered. Whilst making this exploration I could not help being struck by the extraordinary extent of the synovial pouches. Those of the vasti reached at least