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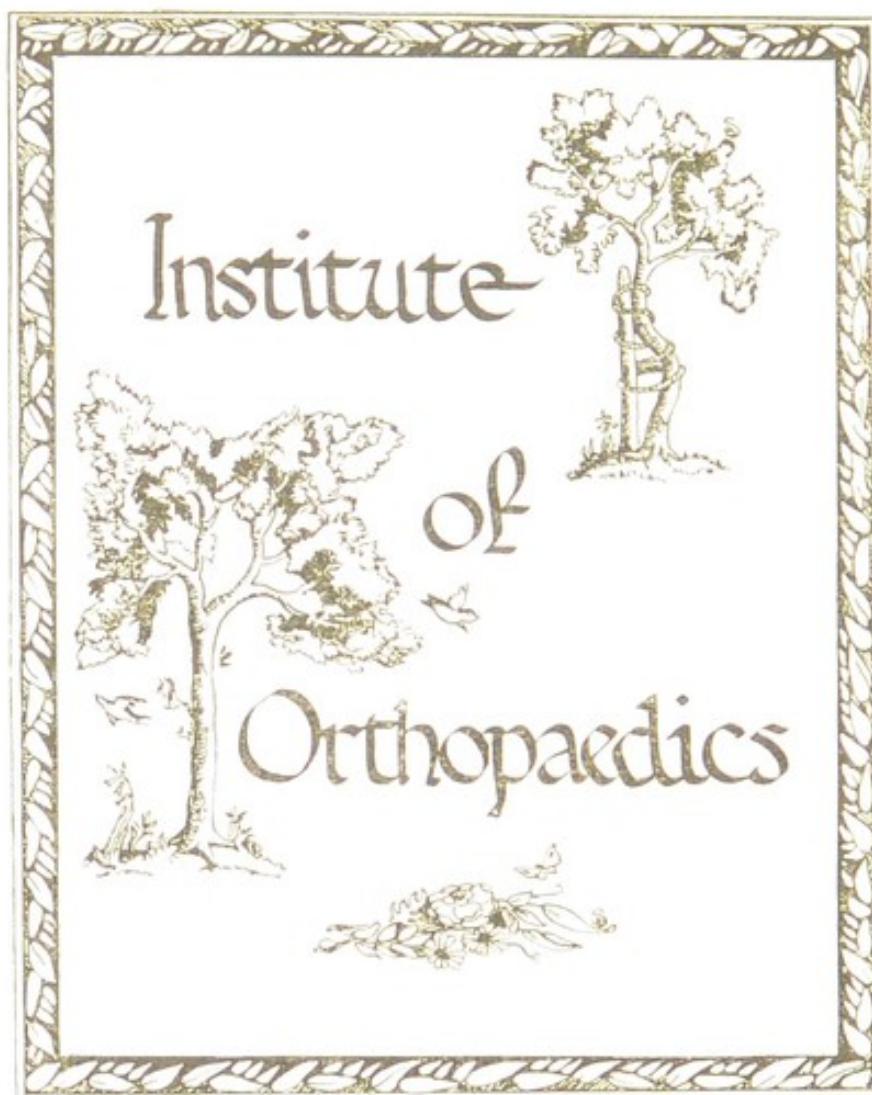


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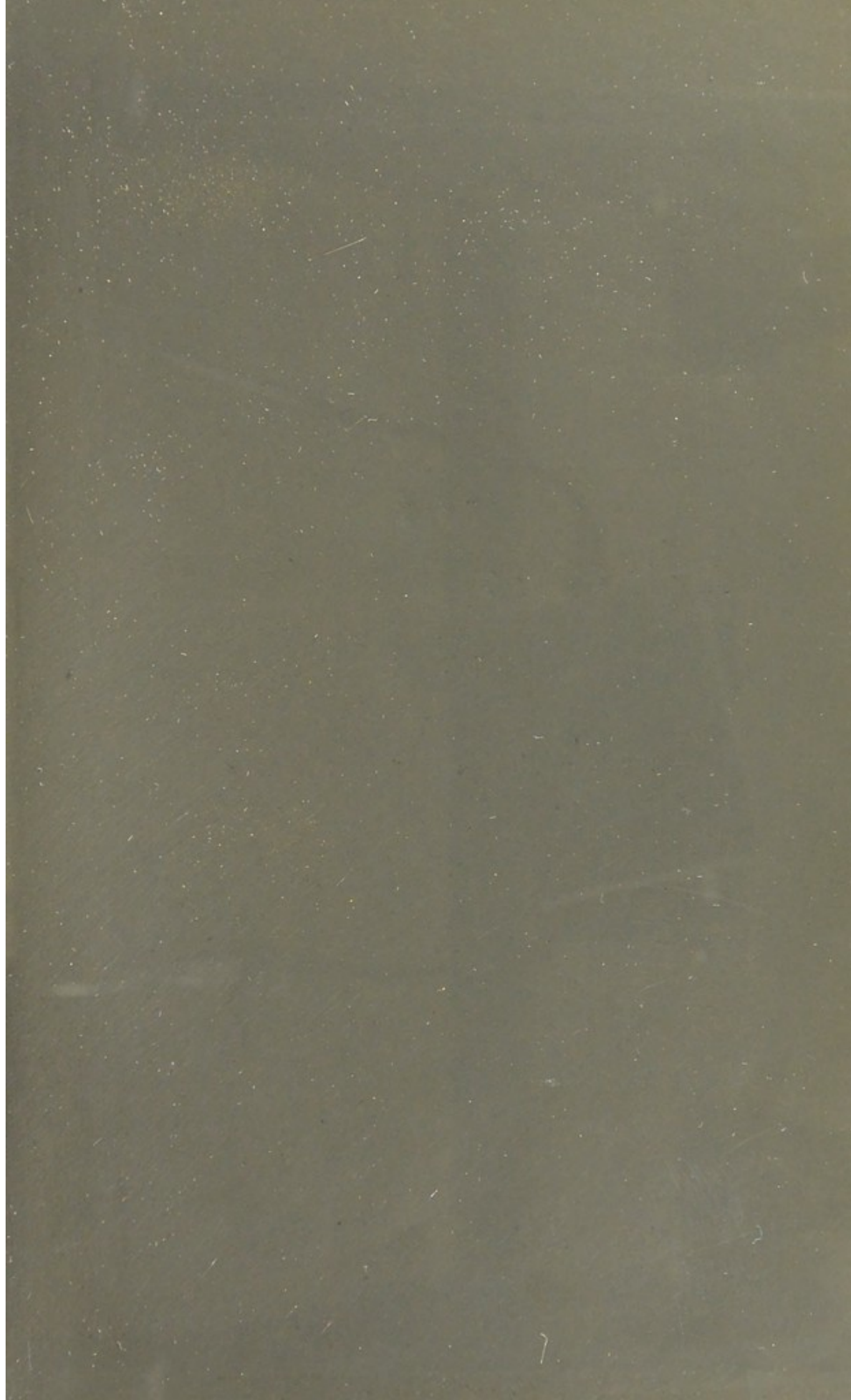
THE
BRADSHAW LECTURE

1897

ALFRED WILLETT



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THE BRADSHAW LECTURE
ON
THE CORRECTION OF CERTAIN DEFORMITIES BY
OPERATIVE MEASURES UPON BONES.

*Delivered before the Royal College of Surgeons of England on
December 8th, 1897.*

BY ALFRED WILLETT, F.R.C.S.,

Examiner in Surgery University of Cambridge and Royal College of
Physicians of London; Surgeon, St. Bartholomew's Hospital.

MR. PRESIDENT AND GENTLEMEN,—The subject I have chosen for this year's Bradshaw Lecture is "The Correction of certain Deformities by Operative Measures upon Bones." Although, no doubt, osteotomy is especially the operation for correcting deformities radically, yet many other forms of operation of a far-reaching character are employed, and hence, by reason of the varying procedures which may be adopted in the treatment of deformities, it has not been quite so simple a matter as might appear at first sight to provide a heading to this lecture, which, whilst sufficiently comprehensive, should yet not be too minutely descriptive as to become confusing.

OSTEOTOMY AND OSTEOCLASIS.

To Mr. William Adams, of orthopædic surgery fame, must be ascribed the distinction of first placing before the profession—certainly in this country—a definite and carefully-matured plan for correcting faulty position in cases of synostosis at a joint; in the case in point it was the hip-joint, for which he proposed to saw through the neck of the femur. Mr. Adams called his operation—which, by the way, was performed for the first time on December 1st, 1869—subcutaneous osteotomy, since he operated upon the lines of subcutaneous tenotomy, making an incision only just large enough to admit of the introduction of a fine saw he had devised; then sawing in great part through the neck of the femur, and finally wrenching forcibly, he in this way fractured the bone. He instantly closed the wound, and all through the operation carefully excluded the entrance of air. I witnessed one of Mr. Adams's earlier operations, and well I remember how immediately and completely the deformity was removed. I was much impressed by the precision of the whole procedure.

Adams's operation was introduced before the days of antiseptic surgery, and although in his cases I believe suppuration rarely occurred, other surgeons who followed his teaching were not so fortunate, suppuration following in not a few instances, while even Mr. Adams himself, Mr. John Croft, and I had each to record a fatal result. At the time Mr. Adams claimed the highest surgical importance for the subcutaneous character of his operation, as introducing a new feature and a wider scope for the principles of subcutaneous surgery: for by open wounds other surgeons both in this country and in the United States had divided bones, taking away even wedge-shaped portions in close proximity of joints for the correction of deformities, the result of synostosis in faulty position after arthritic disease. I only allude to the importance then claimed for the subcutaneous principle in Adams's operation, to say how entirely it has vanished under the universal acceptance of the Listerian law of asepsis in operative surgery.

Osteotomy has been since performed in many somewhat similar deformities, such as faulty position after fracture, the division of, or removal of wedge-shaped portions from, curved rachitic bones and the like. In 1879 Professor Macewen, of Glasgow, brought before the profession a new method of dividing bones by mallet and chisel, applying it specially to the correction of knock-knee; but, with the advent of antiseptic surgery, more extensive operations by open wounds of sufficient magnitude for the necessary manipulation have been introduced; so that now, with but little risk to life or limb, operative measures are adopted for the radical treatment of a large number of deformities. Thus, in addition to the removal of wedge-shaped portions of bone in cases of curved tibiae, I may give the removal of portions of several bones, as in tarsectomy for inveterate club-foot; and, again, the resection of an entire bone, as the cuboid or astragalus, for the same deformity. Yet another measure must be mentioned—an operation having for its object the production of a simple fracture by powerful, specially contrived apparatus, such as was a few years since introduced by the late Dr. Grattan, of Cork. He gave the name of "osteoclasia" to the operation, and of "osteoclast" to the instrument. I have it here (Fig. 1), as also another, Thomas's osteoclast (Fig. 2), which I regard as in every way superior in device and practice. Rapidity of action in an osteoclast is essential, sudden impact also seems necessary to make a bone crack across, as well as to avoid seriously damaging the soft parts by continuous pressure. In all these points Thomas's osteoclast has the advantage over Grattan's. Neither the instrument nor the operation ought to be confused with methods for treating knock-knee, once very much in favour with the Continental surgeons, and known by the names of *redressement forcé*, *ostéoclasie manuelle* and *ostéoclasie mécanique*; for whatever lesions, and they were diverse, were produced on the knee-joint or on its surrounding structures, these procedures aimed at forcible straightening the limb at the knee.

Osteotomy is the most reliable operation for deformities involving long bones, and is the one I invariably select for patients over the age of 14. Its performance is characterised by great precision, it is most effective in accomplishing the desired object, and has but very rarely been associated with disaster of any sort, either to limb or life. Whilst, however,

its risk in children is almost *nil*, I must confess I undertake Macewen's operation with some misgivings in young adolescents, who are growing rapidly, have large limbs, and whose bones are very vascular, as it is in such patients as these, I have seen osteomyelitis, and necrosis supervene twice, whilst not infrequently a sharp rise in temperature has caused anxiety for a few days. Simple osteotomy—by the term simple I mean division of a bone only—performed either with saw or chisel is, as I have just stated, applicable in cases where, as the result of disease or of accident, deformity

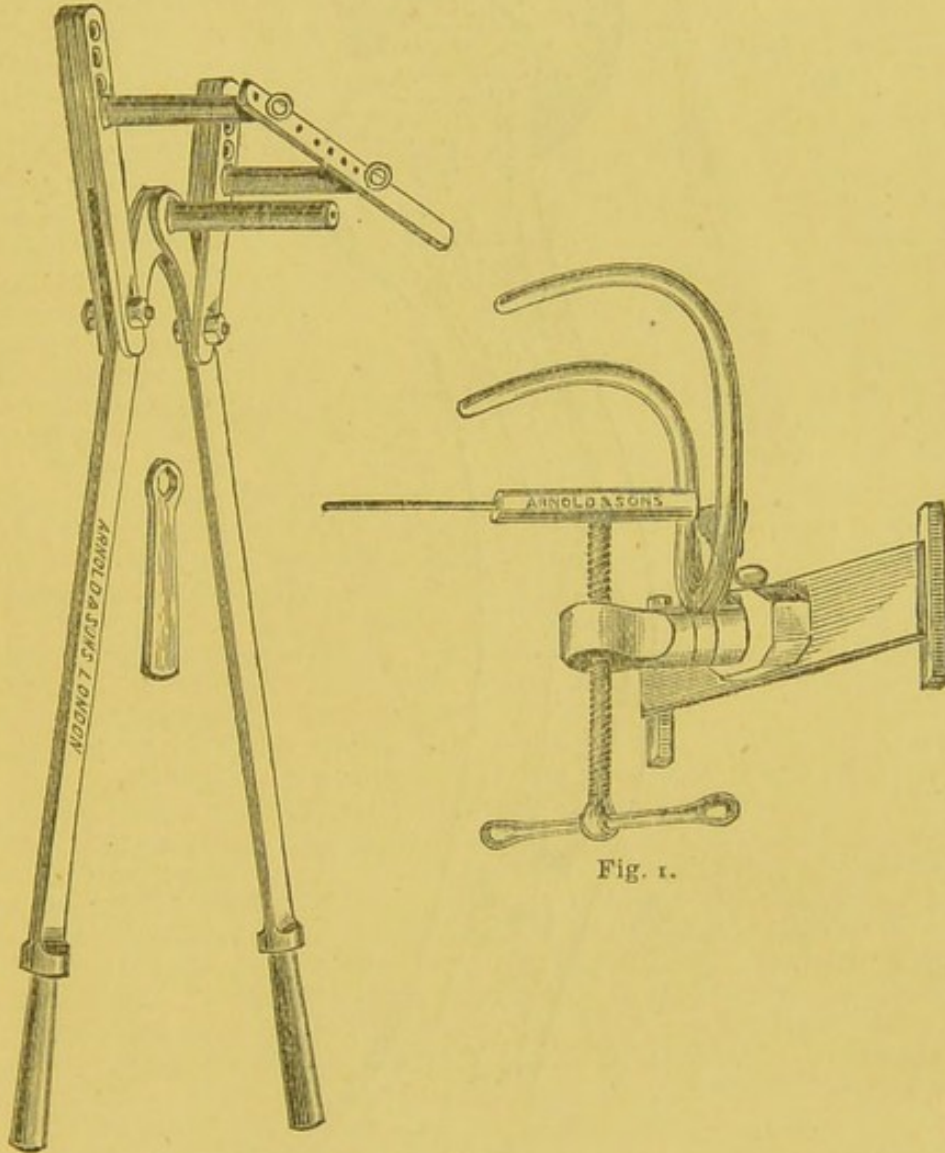


Fig. 2.

so considerable as to call for correction exists. Personally as between saw and chisel, I give preference, where choice may be said to exist, to the chisel, but sometimes when intending to make an oblique section I saw a deep groove, and then chisel through the rest of the bone, thus employing both methods.

Before, however, leaving the subject of osteotomy, I wish to say a few words on the subsequent treatment of the wound. Mr. Adams laid great stress upon the endeavour absolutely to exclude air, and upon the hermetic closure of the wound

immediately after the division of bone, as in subcutaneous operations. Very early in my experience of osteotomies I became convinced of the unwisdom—indeed, I would go so far as to say the peril—of this course, because it is not possible to exclude air entering the wound, and in all these operations, practically I have left the osteotomy wound quite un-



Fig. 3.

closed in any way in the expectation that the blood oozing from the divided vascular bone would escape into the dressings, and in not a few cases I have even passed a wire drain down to the seat of fracture to drain the deeper portion of the wound. I am, I believe, fully borne out by facts in making the statement that where there has been a free escape of

blood into the dressings the patient's progress has been absolutely uneventful, and that it is to tension from the retention of blood around the divided fragments I have traced the very occasional symptoms of high temperature and sympathetic irritation.

I do not propose at this moment to make any general comments on procedure in more extensive osteotomies, such as involve the removal of bone, but with regard to osteoclasia as accomplished with Thomas's osteoclast I think this operation has not as yet met with that approval from hospital surgeons which I and some of my colleagues at St. Bartholomew's Hospital are inclined to bestow upon it. One objection taken against osteoclasia is that the operator cannot ensure the line of fracture being at a given level with the exactness that is attained in osteotomy. I must say I regard it as immaterial to the success of the operation whether the fracture takes place an inch higher or lower in the bone, for after both operations a fining down of the irregularities in outline may be confidently expected to follow. In support of this contention I show a femur from the Museum of St. Bartholomew's Hospital, from a boy who died of meningitis three years after Macewen's operation for knock-knee, performed by my colleague Mr. Howard Marsh (Fig. 3). The line of the osteotomy is still quite apparent, but it will be observed that it is fully an inch and a-half above the usual site of the division of the bone. This is explained, of course, by the fact of growth from the epiphysial end of the diaphysis in the period between the operation and the boy's death, thus it is manifest that after Macewen's operation the line of fracture is gradually raised in the growth of the patient.

The selection of the supra-condyloid site for division of the femur by Macewen rests less upon any special advantages for this particular site than upon its superiority as regards safety in regard to the position of the vessels. I regard the age of 13 or 14 as about the highest limit at which osteoclasia should be practised. Above this age there must be, owing to the strength of resistance in the bones of the thigh and leg, so much risk of lacerating the soft parts that osteotomy is preferable. But as acquired deformities are mostly seen under this age limit, and as the two deformities, the one at the knee-joint, genu valgum, and rachitic curved tibiæ form a large proportion of the deformities coming under treatment, it follows that since the introduction of osteoclasia, and since reliable osteoclasts have been manufactured, I have adopted osteoclasia very generally at St. Bartholomew's Hospital. I should add, that even in young subjects the osteoclast occasionally fails. This seems due to the yielding condition of bones in the primary stage of rachitis, rather than to any defect in the osteoclast. Only once have I seen any skin lesion, beyond simple bruising, occur. I was acting on that occasion as assistant rather than operator, although directing the steps of it. The case was one of double genu valgum in a rickety child of 4. After one femur had been successfully broken, and whilst breaking the bone of the other limb, a transverse rent of skin only, nearly 3 inches in extent, was made by the middle or driving bar. On close examination of the osteoclast I found that this bar, instead of being loose and so able, as it were, to roll on its pivot on meeting the thigh, had locked, the result being that the skin had been

forced tightly against the femur, then the bar of the osteoclast sliding, instead of rolling, the skin was at this point subjected to so sudden and severe a strain that it gave way. No real harm resulted, the wound, after having been thoroughly cleansed by antiseptics, was closed by continuous suture. It united throughout by primary intention, the ultimate result being as satisfactory in this limb as in the other. In the comparatively few instances where I have subsequently performed osteotomy when osteoclasia has failed, the operations have been carried through just as satisfactorily and completely as if no previous attempt had been made to fracture the bones.

STATISTICS.

As the correction of deformities in the upper extremity is so seldom called for, except for faulty position after fracture, I propose only to take into consideration the application of the operations I have mentioned to the deformities of the lower extremities. Upon investigation I find I have performed 634 operations on 383 patients. The proceedings have been as follows:

I.— <i>Deformities due to Ankylosis at the Hip.</i>						
Operations.						Patients.
11	Adams's	...	...	...	...	—
20	Gant's	...	...	...	...	—
31						28
II.— <i>Knock-knee and Allied Deformities.</i>						
Operations.						Patients.
232	Macewen	...	...	...	...	137
159	Osteoclasia	...	...	...	...	83
21	Reeves-Ogston	...	...	...	...	16
412						236
III.— <i>Bow-leg.</i>						
Operations.						Patients.
40	Osteotomy	...	...	...	...	32
105	Osteoclasia	...	...	...	...	55
145						87
IV.— <i>Inveterate Club-foot.</i>						
Operations.						Patients.
23	Astragalectomy, tarsotomy, and tarsectomy				...	14
V.— <i>Hallux Valgus and its Allied Conditions.</i>						
Operations.						Patients.
14	...	...	...	...	...	9
VI.— <i>Deformities resulting from Fractures of Long Bone</i>						
Operations.						Patients.
9	...	...	...	...	...	9

There have been 2 deaths, 1 after Adams's and 1 after Macewen's osteotomy.

ANKYLOSIS OF THE HIP.

The most common deformity in ankylosis at the hip-joint is flexion, inversion, and adduction; this induces as a secondary result lordosis and lateral tilting of the pelvis. A less frequent, but still well-recognised deformity, is outward rotation, with more or less of abduction and perhaps with flexion. Now as to the nature of the uniting bonds. The cases may be classified as follows: (1) There may be simply synostosis of the head of the femur to the acetabulum (Fig. 5), occasioned by some very acute inflammatory affection, most

frequently of an infective type, such, for example, as gonorrhoeal rheumatism, in which the stress of the pathological processes have been limited to one joint; or (2) the ankylosis, being also bony in character, may be very much more widely diffused, as is commonly seen in tuberculous disease of the hip-joint where caries has extensively affected the bones on either side of the articulation and (3) the ankylosis may be firm, close, and extensive, but the bond of union remains fibrous. This condition may result from more chronic forms of rheumatism and tuberculosis, where the disease remains limited mainly to the synovial membrane and fibrous capsule of the joint, with, later on, fibroid degeneration of the cartilages.

Clearly, the surgeon's first duty is to determine the precise nature and extent of the induced deformity. I need scarcely enforce the rule that to do this the patient's trunk must be placed flat and square on the bed. The extent of deformity of course varies, and it is hardly possible to lay down dogmatic rules for saying that any definite degree of deformity justifies operative measures for its correction, while for a less degree a high-heeled boot suffices. Each case must be judged on its own defects. Obviously if a patient can only get along with a crutch or stick, there will be no question of the expediency of operation *quâ* deformity; in other cases, one must decide after seeing the patient walk, hearing what the walking capacity is, and the suffering and inconvenience occasioned by any over-walking, and also how far the deformity is a bar to earning a livelihood.

If we place the first and probably most of the third of the before-mentioned classes into one group, and regard them with Mr. Adams as the rheumatic type, in which the greater trochanter stands out prominently, indicating the existence of a healthy neck of the femur, with, as a rule, absence of old abscess scars, and in which also there is an entire absence of bosses of new bone around the hip-joint (Fig. 4), we have the cases of deformity for which Adams's operation was devised, and for which its author has expressly limited its employment. In the second class, called, by way of contrast, the tuberculous, where scarring, production of new bone with thickening and flattening of the trochanter are present, we have, on the other hand, the cases which Mr. Adams emphatically pronounced to be unsuitable for his operation. It was for this class, forming by far the larger proportion of cases of deformity after hip-joint diseases, that Mr. Gant devised subtrochanteric osteotomy. Thus the aim of both surgeons was to divide the femur where it is healthy, and since Adams and Gant devised their operations for quite distinct conditions, there is in practice seldom any difficulty in deciding which operation should be performed.

Whether after Adams's osteotomy efforts should be made to prevent bony union, and thus to preserve a false joint, is a matter of some importance. The questions are, whether in the first place it is possible to ensure fibrous union, and so procure a false joint; in the second, whether, after all, movement is an essential element in the success of the operation. So far as I can judge from perusing recorded cases, it appears that the same line of after-treatment, such as early passive motion, was adopted both in the few cases where false joints formed as in the far larger proportion where bony union resulted. Mr. Lund's (Manchester) patient was, I believe, the first in-

stance of false joint after the operation in question. Mr. Adams tells me he has never obtained a false joint, whilst Mr. Jessop preserved motion in 1 out of 5 cases. In some three or four of my earlier cases I also failed, having to yield at length to the patient's entreaties to give up the attempt. I have come to the conclusion that in Adams's operation chance has probably more to do with the formation of a false joint than design, that bony union is to be regarded as the normal repair, and that where this fails and a false joint occurs, this result is dependent upon the same processes as influence repair in intracapsular fractures of the neck of the femur. In my later operations I have made no attempt to procure

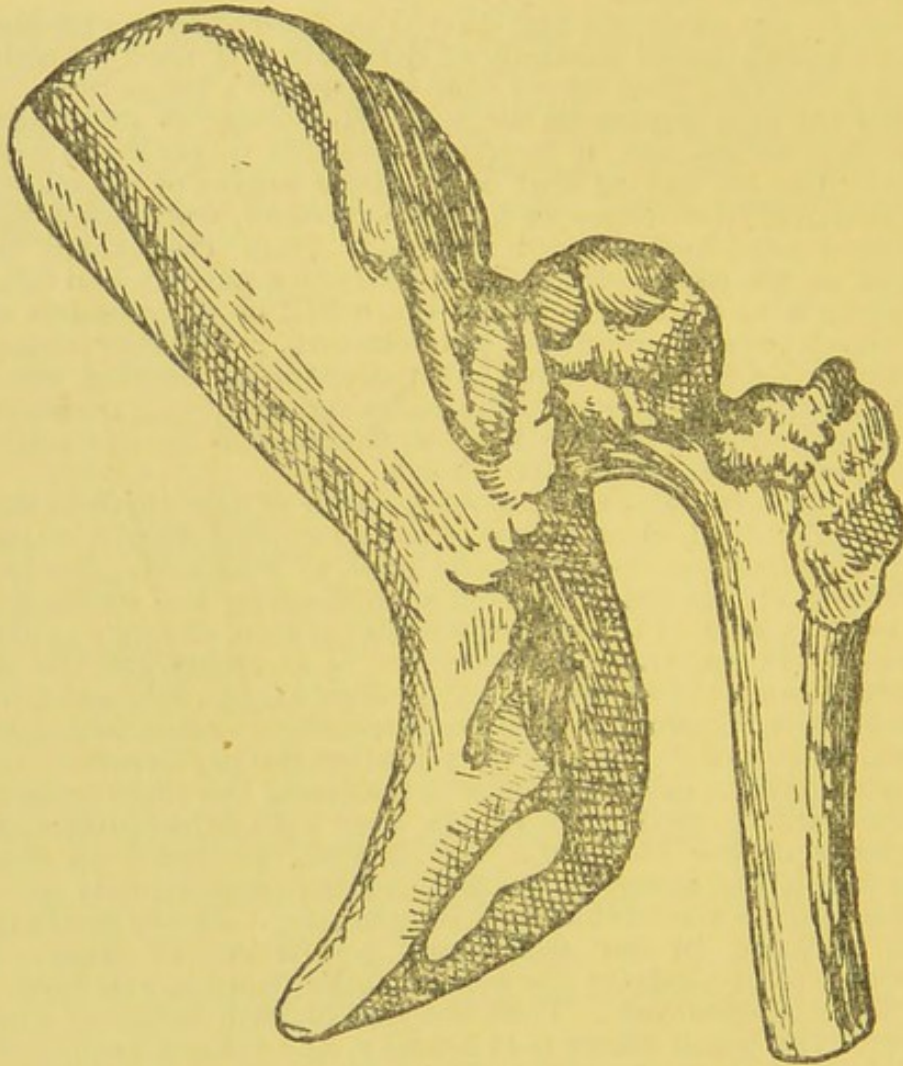


Fig. 4.

false joints, in the belief that it is immaterial, and also that the attempt entails considerable risk of relapse or return of the deformity. More particularly will this be likely to occur if splints are very early put aside. I regard the occurrence of bony union after Adams's operation as immaterial to its success, so long as the joint disease and its resulting deformity have been single—that is, limited to one hip-joint, for after correction of deformity I have no hesitation in stating confidently that patients walk well, finding adequate compensation for one stiff hip in the movements at the remaining healthy hip-joint and of those in the lumbar spine. After the performance of Gant's operation this question of the

desirability of a false joint does not arise, the after-treatment, being the same as for fractures of the shaft of the femur, is directed to ensure bony union.

In the, happily rare, event of synostosis of both hip-joints, it is absolutely necessary in correcting the deformities so to plan the operations as at least to procure one false joint. Something more than simple osteotomy must be done, and in my opinion a modification of Sayre's operation gives the best prospects. Premising with the comment that patients after recovery from excision of the head of the femur by the

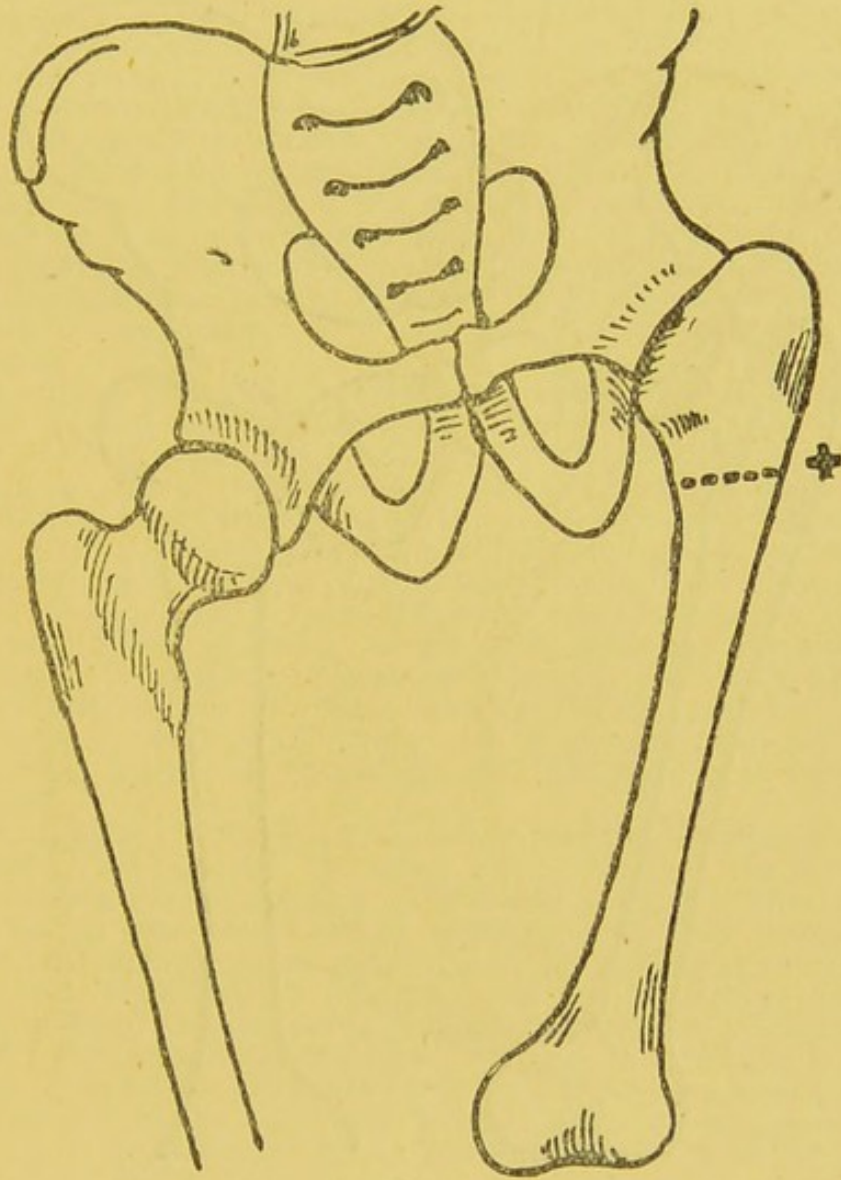


Fig. 5.

anterior method have in my experience good false joints, it seemed to me that a resection of the head and neck of the femur, if it were found practicable to detach the head from its connection with the acetabulum, was the best means that could be adopted, and the neck and part of the trochanter, if the head were too firmly united. I have now a girl aged 13 under my care in St. Bartholomew's Hospital. She was admitted with ankylosis of both hip-joints, following disease of eight years' duration. On admission the right limb was fixed in flexion only, at an angle of 130° with

trunk; the left, flexed at an angle of 120° , was also inverted and adducted. On November 15th I performed the following operations: Making the usual incision over the front of the right hip-joint, I deepened it, until reaching its capsule, which was adherent to and blended with the periosteum of the neck of the femur; freeing the connections along the anterior border of the acetabulum, I endeavoured to force the head out of this cavity; finding, however, that complete synostosis had apparently taken place—for although very

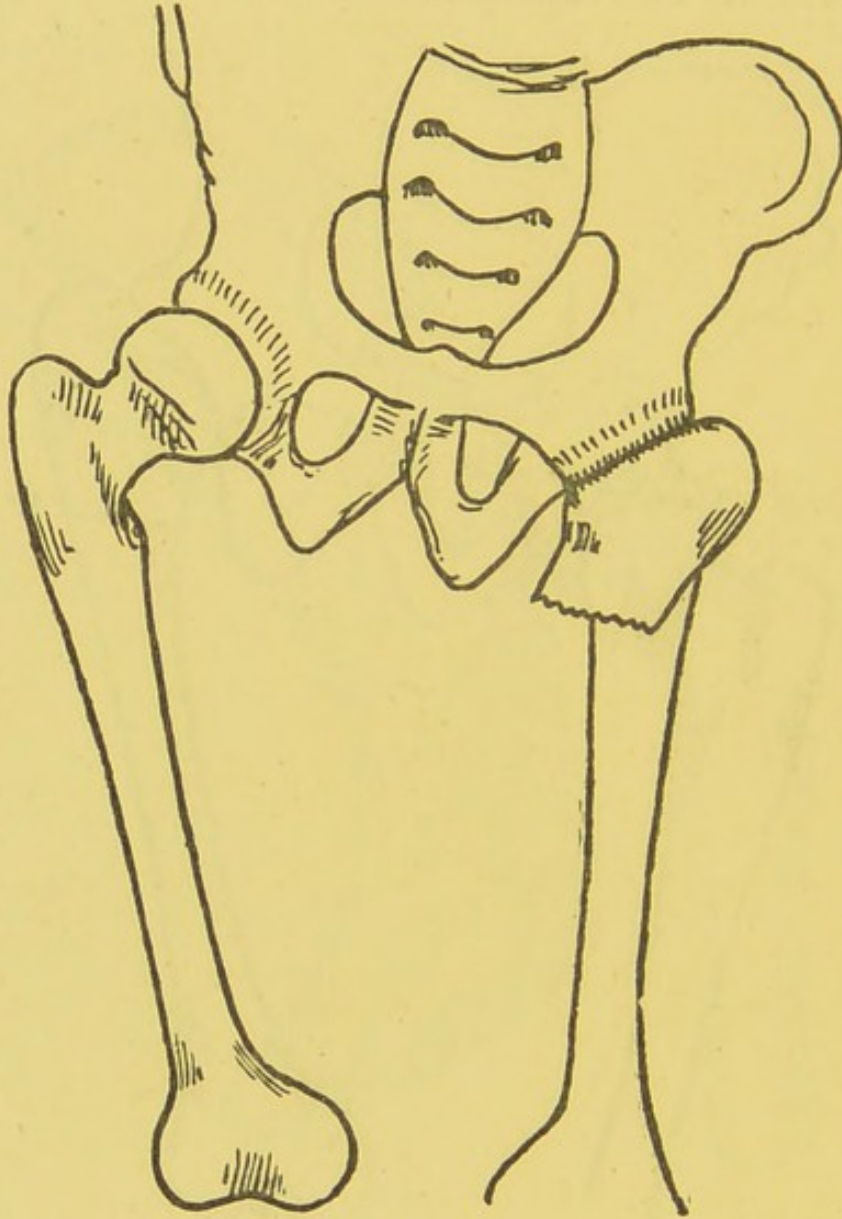


Fig. 6.

considerable force was used, there was not the least sign of yielding or any kind of movement between pelvis and head of the bone—I proceeded, partly with Adams's saw and partly with chisel and mallet, to cut out the neck and some portion of the adjoining surface of the great trochanter, leaving a clear interval of about $\frac{3}{4}$ inch between the pelvis and the femur. On the left side I performed Adams's osteotomy through the neck. Both limbs came down into position extremely well, the girl's trunk lying flat on the double Thomas's hip splint, into which she was placed. The left

limb was set at moderate abduction. Weights of 14 lbs. to the right and of 5 lbs. to the left leg were attached after her return to the ward. Passive movement was commenced at the right hip after a week, and already she can flex and extend the thigh slightly.

One other point which I desire to touch upon is the line or position in which the bone should be placed or set after the completion of either Adams's or Gant's operation. I may remark that I use a double Thomas's hip-joint splint in these operation cases. Every surgeon knows if, after hip disease, adduction of the thigh forms one element in the deformity, that then the apparent shortening of the limb will be greater than the real (Fig. 5). On the other hand, if the thigh be abducted, the difference is the other way; either the apparent shortening is less than the real, or apparent lengthening is found. Well, if on measuring the two limbs before operation I find actual shortening exists, then, in setting the limb after osteotomy, I place it in the abducted position, the result being when union has taken place that that side of the pelvis is permanently tilted downwards, the apparent shortening is correspondingly lessened, and sometimes so completely as to make it unnecessary to add a sole to the patient's boot. (Fig. 6).

I will briefly mention a few cases in illustration of this view. I performed Gant's osteotomy quite recently for bony ankylosis in a lad, aged 17. The affected limb (the right) was $3\frac{1}{2}$ inches shorter than the left; at least 2 inches of this was accounted for by lessened growth in the thigh and leg bones. The thigh was fixed in eversion of fully 90 degrees, so that the heel of the right foot rested against the inner side of the left leg (Fig. 7). This deformity was the result of an acute arthritis, probably tuberculous, although the patient called it rheumatic, two years previously. The limb fell into excellent position after the femur was divided and was set in abduction. There is only now 1 inch of apparent shortening, although by measurement the real shortening is fully $2\frac{1}{2}$ inches.

A similar result occurred, after Gant's osteotomy performed in 1880, in the case of a young woman with synostosis in extremely deformed position; the angle of flexion was less than 90 degrees with the pelvis, so that after operation, and on bringing the limb down straight, the end of the upper fragment was felt projecting prominently beneath the skin, just below Poupart's ligament; there was considerable real shortening, yet, owing to the limb having been set in abduction and the consequent tilting downwards of the right side of the pelvis when she stood, this woman walks with scarcely perceptible limp, and without any extra sole to her boot.

The photographs (from which Figs. 8a and 8b are taken are of a patient, aged 64, upon whom I performed Gant's osteotomy on both femora ten weeks since. Those who are acquainted with Mr. Clement Lucas's article on Cross-legged Progression in the Clinical Society's *Transactions* for 1881, will have no difficulty in identifying the man as one of the two patients Mr. Lucas exhibited. The man came to me at St. Bartholomew's, asking if some operation could not be done for him, as, owing to the development of Dupuytren's contraction in both hands, he could no longer firmly grasp stick or crutch, and hence walking was laboured



Fig. 7.

and very slow, causing much pain in his hands, often compelling him to let his sticks drop. He retained about 30 degrees of motion in the right hip joint. My colleagues encouraged me to do osteotomy below the trochanters in both

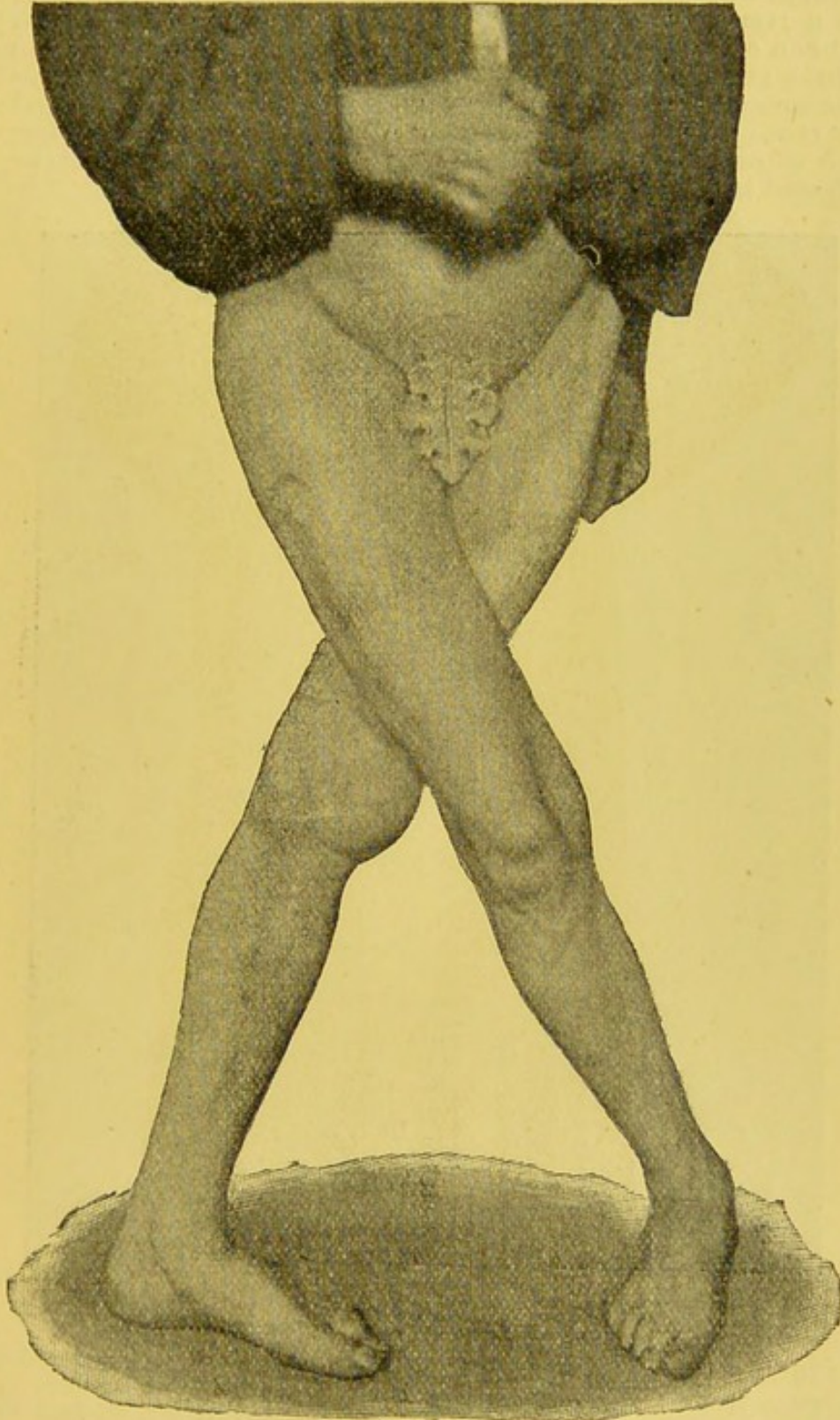


Fig. 8 a.

thighs in the expectation that if he were set upon his feet with his legs parallel, he should be able, with the range of movement he retained in the right hip-joint, to walk fairly

well. It is, of course, too soon to venture any definite opinion, but it is not in his favour that he has proved an obstinate and self-willed patient.

I have on the table part of a femur and pelvis taken from a woman who died nine years after a Gant's osteotomy. Lately, as a result of injury, her old tuberculous hip disease had broken out again, associated with profuse suppuration, from which she recently died. The specimen shows the extensive character of the disease, and it also shows the angle formed by reunion of the divided femur in its altered position after the osteotomy. For over eight years she had led an active life and had been quite well.

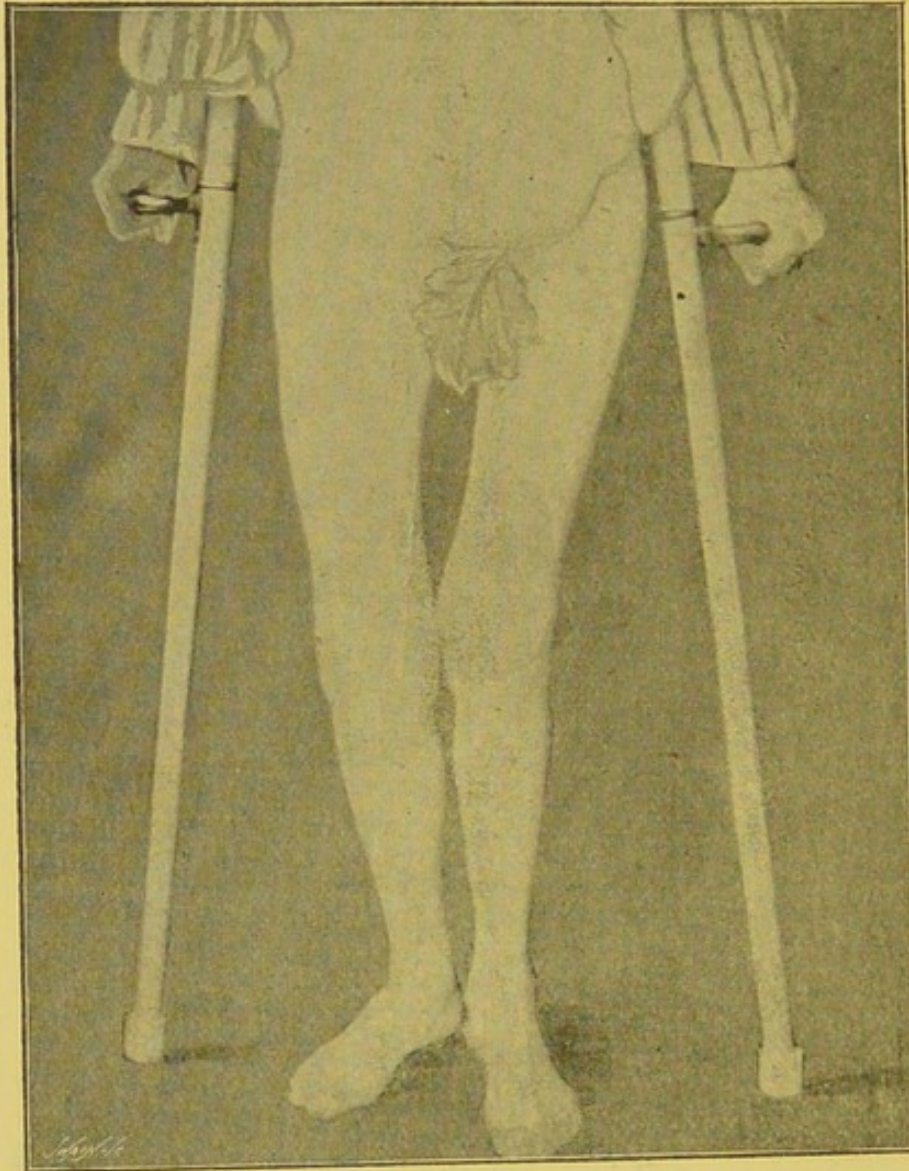


Fig. 8 b.

DEFORMITIES OF THE KNEE.

It is, I think, unfortunate that there is no generally accepted rule for estimating the extent of the deformity in knock-knee—I mean in relation to the amount of abduction of the leg. Whilst in complete agreement with Professor Macewen, that neither the distance between the two internal malleoli, nor yet the distance of each internal malleolus from the sagittal line, forms any reliable guide to

the actual extent of the deformity for the purposes of comparison, I am unable to follow, or clearly to comprehend Dr. Macewen's scheme for recording the degree of deformity (Fig. 9).

The angle which I am accustomed to take for recording the amount of deformity in any case of knock-knee is the one

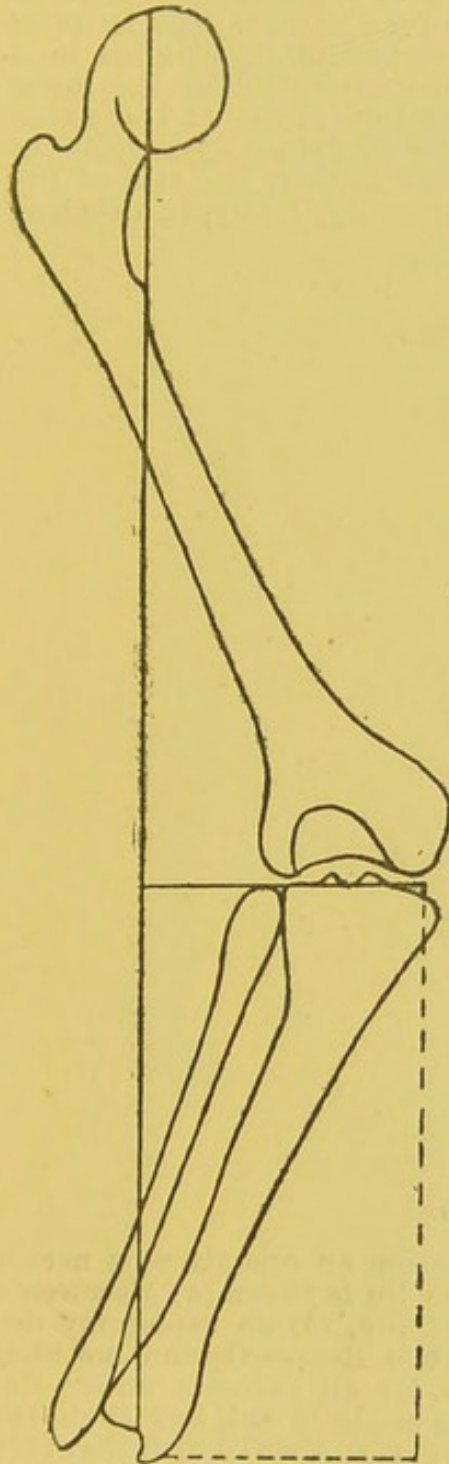


Fig. 9.

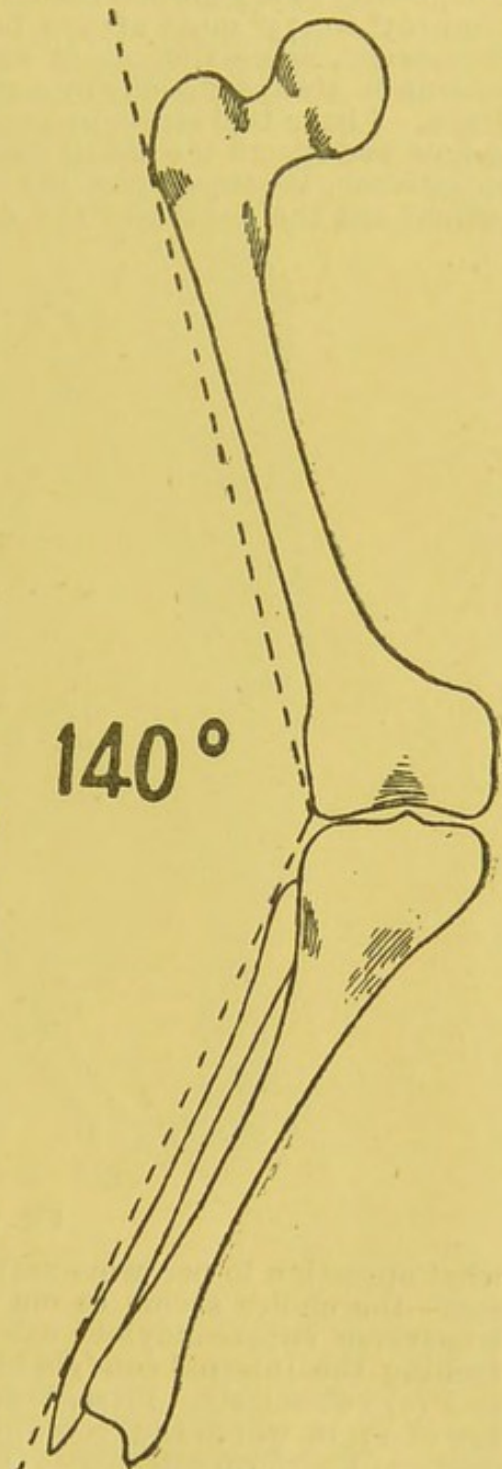


Fig. 10.

formed at the outer aspect of the knee, by the meeting of two lines, the one drawn downwards from the great trochanter to the external tuberosity of the tibia, passing over the outer surface of the external condyle, and the other upwards from the external malleolus to the outer surface of the external

tuberosity of the tibia (Fig. 10). Of course, in this angle, as in any other way of measuring the deformity in question, some allowance will often require to be made for secondary deformities, arising through curving, or other alteration in shape, of either femur, or tibia, and fibula, or of all of these bones due to rickets, which so frequently exist. It may be objected that, owing to the normal obliquity of the femur, an angle of from 165° to 175° must always be present; but this is quite immaterial, since the actual existence of knock-knee in a patient is always obvious by a mere inspection of the lower limbs. I have laid stress upon the importance of being able to note and record the actual degree of deformity in cases of knock-knee, because upon the two factors, the age of the patient and the degree of the deformity, I rely, in deciding

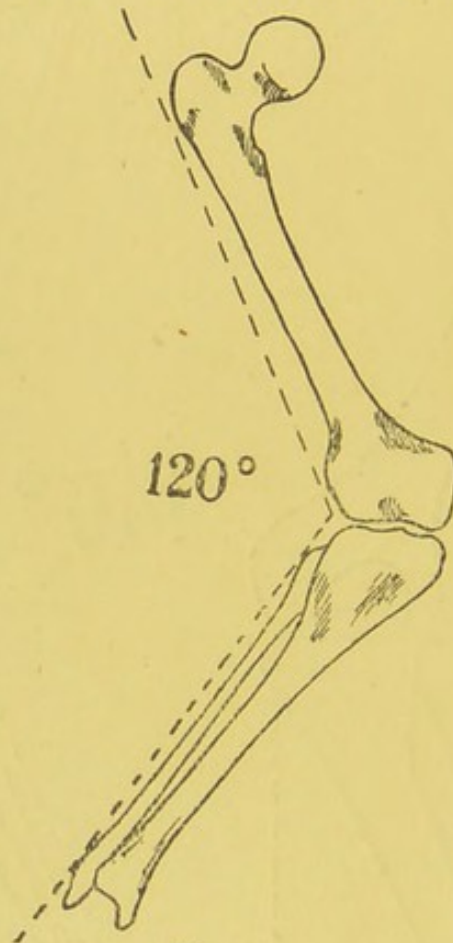


Fig 11.

what operation to perform—assuming an operation is necessary—the choice seems to me to lie between (a) Macewen's transverse supracondyloid osteotomy, (b) an osteotomy detaching the internal condyle by the Reeves-Ogston method, and (c) osteoclasis. First, then, for all patients under the age of 13, in whom the recording angle is not less than 120° degrees, I perform osteoclasis (Fig. 11); about four-fifths of all cases fall under this category. Above this age, being those presumably whose femora are too dense to be broken by the osteoclast, I perform transverse supracondyloid osteotomy, and, with the sole exception that I discard Esmarch's bandage, I do the operation on the lines Macewen laid down. I have never intentionally departed from his first description of the procedure, and since 1885, from which date the

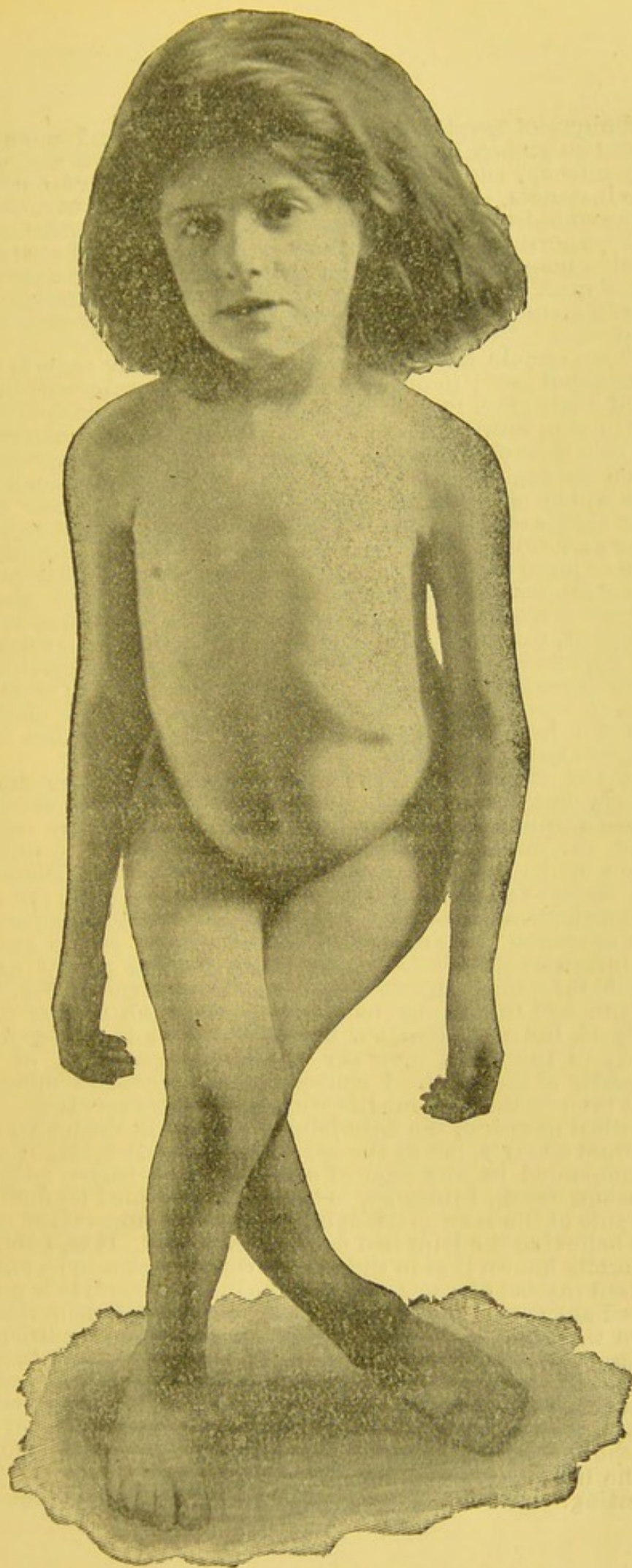


Fig. 12.

technique of aseptic surgery has been more and more reduced to almost an infallible system, I have not met with any mishap, such as suppuration, after this operation. In two instances, however, I had to abandon—for the day merely—the completion of the operation on account of smart arterial hæmorrhage, due to an abnormal position of the anastomata magna artery, and in both I was obliged to enlarge my wound to secure the bleeding vessel. The osteotomy was in each done a week or two later without further incident.

There remain the cases in which the recording angle is less than about 120° ; in other words, more nearly approaching a right angle (Fig. 12). If it be asked why I draw so definite a distinction between the slighter cases with the recording angle varying from about 165° to about 120° , and the severer cases, when the angle is from 120° to 90° , I reply by mentioning a fact which occurred in one of my earlier operations. In a very severe case, where the deformity was almost rectangular, after performing Macewen's operation I found it impracticable to place the limb straight, because when the deformity was corrected the skin on the outer side of the limb was so tightly stretched over the projecting edge of the lower fragment, that not only I, but all those assisting at or watching the operation, felt convinced the bone would inevitably come through the skin, if the limb were left in the straight line. I was able only to lessen the deformity about half, and at a later period I fully corrected the knock-knee by a Reeves-Ogston operation.

In the diagrams (Figs. 13, 14), which have been drawn strictly according to measurement, I have endeavoured to demonstrate how this difficulty in very severe cases occurs after the supracondyloid operation, and, in consequence, I now make it a rule in all severe cases to treat them by the Reeves-Ogston operation in the first place (Fig. 15), and although in one or two instances I have had to supplement this operation by a supracondyloid osteotomy, yet in nearly all instances the Reeves-Ogston operation has proved quite adequate for the complete correction of the deformity (Fig. 12). I would add that in my hands there has been neither difficulty at the operation nor complication in the after well-doing of the cases, nor any apparent impairment of the integrity of the joint. I concur in Dr. Macewen's opinion, that even in Reeves's modification of Ogston's operation, as a practical question, the knee-joint is opened in detaching the internal condyle, but as the operation in question may not be accompanied by any sign of articular disturbance, such as effusion, owing, I imagine, to the outlet provided for fluid by the side of the severed condyle, I can quite understand anyone believing the joint had not been wounded. It is, I think, generally known that in the Reeves-Ogston operation a chisel is used instead of a saw, and that the internal condyle is penetrated above the line of reflexion of the synovial membrane.

On the table is a specimen of the pathological condition of the knee-joint of a young woman who died in the Walworth Infirmary from puerperal mania seventeen months after Reeve-Ogston operation on both limbs in St. Bartholomew's Hospital. The left knee was presented to the Museum of St. Bartholomew's Hospital by Dr. C. Gross, the medical officer to the infirmary. The report upon the specimen is very interesting. This is the description in the Catalogue of the St.

Bartholomew's Museum (pages 45 and 46). Before me are specimens, also from St. Bartholomew's Museum, taken after death from two patients upon whom I had operated by Macewen's method. The specimen (807*d*) was taken from a young man aged 19, who died of pulmonary phthisis nearly two years after double osteotomy. He almost died from profuse suppuration following upon the operation; there can be but little doubt that he was tuberculous at that time. The remaining specimens—two femora—were taken from a patient aged 18, who died within three months after the operation

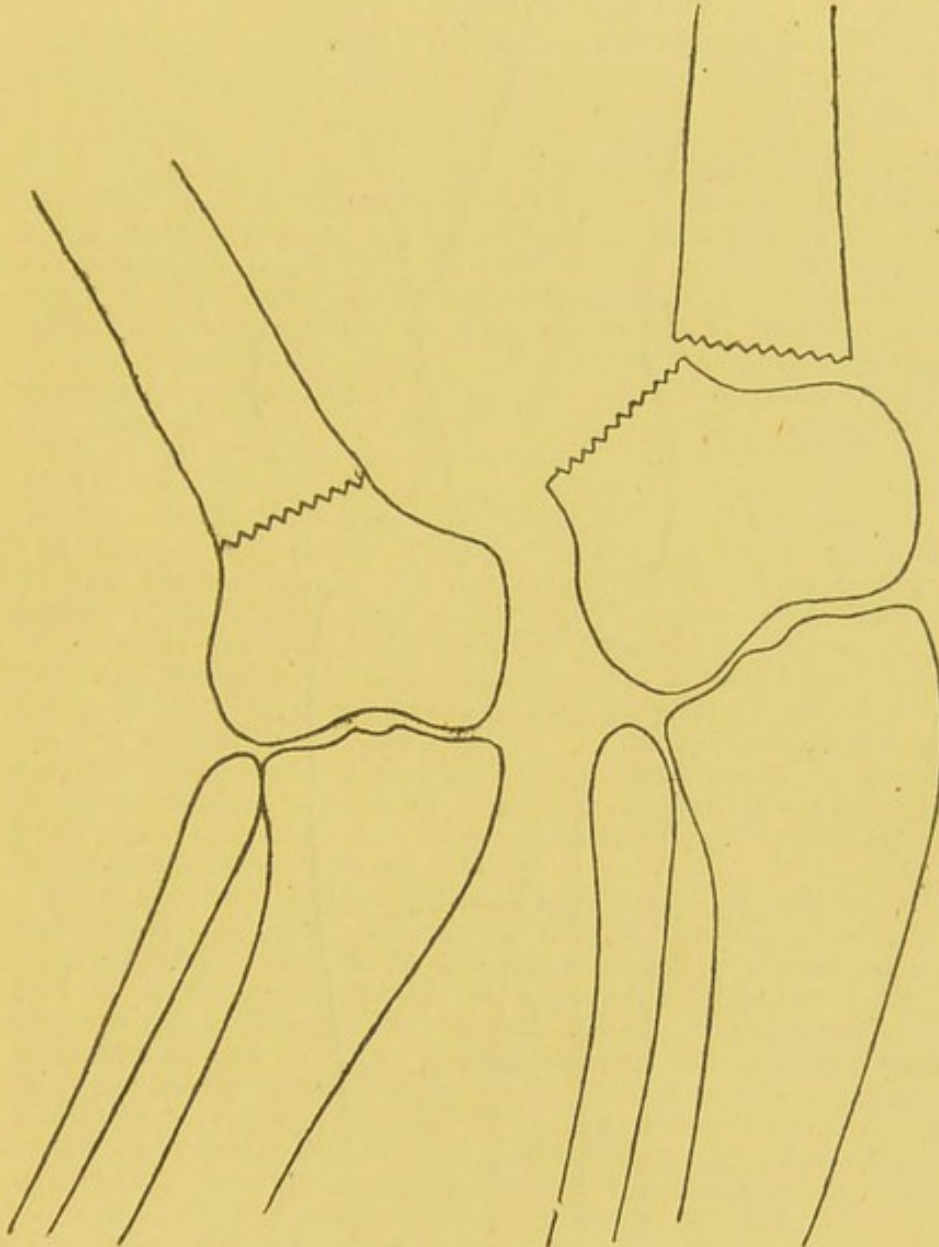


Fig. 13.

Fig. 14.

from pyæmia. In one femur normal repair had taken place, in the other, as well as in the former case, are seen those secondary changes, displacement of the fracture, involvement of the neighbouring knee-joint, etc., which may supervene, and baffle the surgeon when septic fever and rapid emaciation compel him to relinquish every sort of appliance, owing to the occurrence of pressure sores on the slightest provocation. Thus in a very considerable number of Mac-

ewen's operations I have only actually lost one patient directly, and these two specimens are the only entire failures I have to record. In a few cases there have been seemingly relapses after two or three years, so that in perhaps five or six I have been obliged to repeat either Macewen's operation or osteoclasia.

Early in my lecture I implied that for rickety deformities

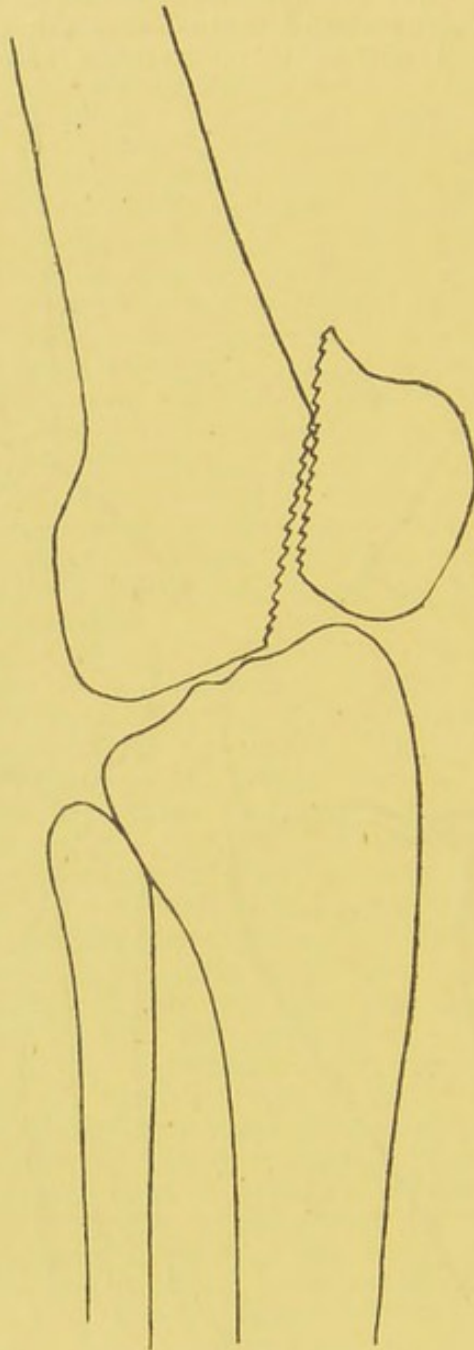


Fig. 15.

of the bones of the leg in young patients the operation I am in the habit of performing is osteoclasia; and I am confident that my success in correcting deformities in these cases is quite as good, and I am inclined to think better, than by osteotomy, either with or without removal of a portion of bone, while convalescence is greatly expedited.

As rickety bending and bowing of the legs predominates in

quite young subjects, I have in recent years had but few occasions for performing osteotomy. I will, however, take the opportunity of saying I am not in favour of removing wedge-shaped portions of the tibia in correcting the severer forms of this deformity, partly because union is delayed by this step, but chiefly because I have not found it necessary, for by sawing in an oblique line over the convexity, and completing the division of the bone with the chisel, I am enabled to slide the lower fragment upwards, and by this manœuvre bring the leg straight.

BADLY UNITED FRACTURES.

At this point it will, I think, be convenient to offer a few remarks upon the operative treatment of badly united fractures; by "badly" I mean, of course, to refer to position, thus bringing them under the category of deformities.

In fractures of the long bones, usually from some peculiar incident in the circumstances of the patient's treatment, union may occur in wholly abnormal positions and cause very marked conditions of deformity. In not a few of the cases of this class that have come under my notice the accident has happened in mid-ocean, on board trading vessels having no surgeon on board. I learn that under these circumstances the individuals responsible for the management of the case—it would be an abuse of the word to say treatment of the unfortunate sailor—are the captain and the ship's carpenter. Usually some very rough form of box-splint is manufactured, into which the damaged limb is placed, without thought of position, and of course without any knowledge on the part of these two worthies of the elementary principles of setting a limb. Under these conditions union in very faulty position is of course very likely to follow, indeed one can scarcely see any help for it. If this be, as I have every reason for believing it to be, the actual state of things in the mercantile marine service, I maintain that the time has come for insisting that a course of instruction in "first aid to the wounded" should be enforced upon those who, under such circumstances as I have stated, may be called upon to take charge of an injured person.

Most hospital surgeons must have seen cases such as I have just mentioned, and after a fracture of the femur to enable a patient thus crippled to get about again and walk in some sort of way, various forms of apparatus may be devised; shortening is the most common defect, and lucky is the patient who has no worse complication than this, for then a high-heeled boot, by making up the deficiency in length will meet the necessities of the case. But when the fracture has united not only with much overlapping, but altogether out of position, the patient may be well-nigh absolutely unable to walk at all and condemned to go about on crutches.

In cases like these refracture, permitting reduction into proper position, is imperatively required; if the accident has been tolerably recent this may be easy. Occasionally I have used the osteoclast. Should all efforts fail, osteotomy is the only resource left, and I have obtained very satisfactory results by this operation. I would just mention it is very essential for its success to disengage the fragments very thoroughly, and after careful adjustment, I have generally found it necessary to employ very much more extension weight than in ordinary simple fractures, to ensure full length

being maintained; in one instance I used as much as 30 pounds of shot in a canister. The ultimate results, not only as regards union but of position are, in my experience, extremely satisfactory, although constant supervision is needed to ensure success.

Badly united Pott's fractures are by no means infrequent, in some the deformity has not been reduced at the time of accident; in others it is due to the premature removal of splints. I have seen patients reduced to a most helpless condition, complaining of almost total inability to walk; well, if after wrenching, under an anæsthetic, I have failed to materially improve the defective position, I have proceeded in a few instances to operate, chiselling obliquely through the tibia and dividing the fibula at the site of the old fracture, then after wrenching forcibly I have succeeded in materially reducing the deformity.

CLUB-FOOT.

I would premise that in my opinion radical operations for congenital club-foot are only justified either by the neglect of treatment by tenotomy in early childhood, or where relapse having occurred, a condition appropriately termed inveterate talipes exists. Indeed, I desire to express the strong feeling I entertain that this affection is not only curable in infants by appropriate treatment, but that this result ought to be obtained practically within the first year of life. I put in the saving word practically because of the proneness to relapse, and because to prevent relapse occurring one cannot too forcibly impress upon parents the imperative necessity of suitable efficient apparatus, worn by night as well as by day for many years. But I hold equally strongly that when this condition is established, a radical correction of the deformity is called for, and that an operation should be performed entailing either the removal of a single tarsal bone, such as astragalectomy, or cuboidectomy, or of some such operation as tarsectomy, involving the removal of parts of several of these bones. Whatever the scheme of the operation, it should in my judgment, to be regarded as adequate, not merely remove the apparent deformity, but it should (1) permit of the complete correction of the inversion and upward rotation of the foot; (2) allow the heel to be fully depressed, thus placing the sole of the foot evenly on the ground; and (3) give moderate flexion and extension movement of the ankle.

Of the above-named or of several other operations which might be named, the one which I have come to regard as the best—although even this cannot be regarded as perfectly satisfactory—is astragalectomy, since it most nearly complies with the requirements I have mentioned. Anyone who studies the condition of the bones of the foot in a case of inveterate talipes, cannot fail to note a special abnormality in the astragalus, and which, I think, has a determining influence in maintaining much of the deformity in the foot anterior to this bone. This peculiar defect in the astragalus of club foot lies in the inward curving at its neck, for from this circumstance it follows that the scaphoid, cuneiform, and indeed all the bones in advance of it are directed inwards. Again, the astragalus is the connecting bone between the tibia and fibula above, and the os calcis with other bones of the foot below;

hence, it will be found that when the astragalus has been removed the foot can readily be placed in a natural position.

What I am anxious to convey is, not that the astragalus alone is involved in the deformity, for all the tarsal bones are altered in shape and position. My point is rather this: Take away, say, the cuboid; saw across the tarsus or even remove a wedge from it; yet after either of these operations the curve in the astragalus will still turn the foot inwards; but excise the astragalus and the foot readily falls into position, which there should be no difficulty in maintaining, and a fair amount of useful movement ought to be preserved. A very marked instance of the superiority of this operation was seen in my wards at St. Bartholomew's Hospital some years ago. A boy, about 10 years of age, was admitted into that institution under my care. He was the subject of congenital double talipes equino-varus. In one foot, the left, previous to his admission, the operation of tarsectomy had been performed at another hospital; the usual wedge-shaped piece had been removed, nevertheless the deformity had not been materially altered; the foot was still turned inwards and upwards, and the boy still walked upon the outer surfaces of his feet. I performed the operation of astragalectomy on the other foot, the right; this foot came at once into good position. The result of this operation was so satisfactory that subsequently I performed the same operation upon the left foot, the ultimate result in both instances being that the patient walked well on the soles of both feet. All the same, the right foot—that from which the astragalus alone had been removed—proved the stronger and better foot, the other being stunted and more rigid. I have in one or two instances, after the operation of astragalectomy, found it necessary to perform tarsotomy to correct the inward turning of the distal part of the foot. I have never performed the operation of merely removing the cuboid; it does not, for reasons already stated, commend itself to my judgment as an adequate means of correcting the deformity.

Of other operations which have been suggested, such as the division of the neck of the astragalus, the division of all the ligaments on the inner side of the ankle or of forcible rectification by crushing up the tarsus collectively—one and all have seemed to me proceedings, either so much more severe than the removal of the astragalus, or wanting the advantages gained by that operation.

HALLUX VALGUS, HALLUX FLEXUS, AND HALLUX RIGIDUS.

These conditions have been discussed very thoroughly by Mr. Davies-Colley in the *Guy's Hospital Reports*, and by Mr. Walsham in his work on *Deformities of the Foot*. Time would not permit me; neither, in view of the writings of these two surgeons, is it necessary to treat of the pathology and etiology of this deformity. But they differ in opinion as to the appropriate operation for the relief of these affections, Mr. Davies-Colley advocating removal of the base of the first phalanx of the great toe, whilst Mr. Walsham prefers to excise the head of the first metatarsal bone. I would remark, I have not equal personal experience of both procedures, for the operation which I have invariably performed is that recommended by my colleague, Mr. Walsham, consisting in the removal, by an open linear incision over the internal surface of the metatarso-phalangeal joint, of

the whole of the head of the first metatarsal bone. Much care is needed to place the toe in line with the inner border of the foot, as well as to maintain it in this position for a month or six weeks, in order to obviate relapse, whilst passive movements should be commenced in a fortnight from the operation.

Whilst probably either of the before mentioned operations is sufficiently effective for the purpose of correcting the deformity, that is to say, of bringing the great toe back into line with the inner border of the foot, yet I am of opinion that the operation which I have mentioned—namely, the removal of the head of the first metatarsal bone—has advantages over the other, as by it the surgeon is less limited in effecting an adequate removal of bone, a factor in the success of the operation which I deem of utmost importance, and which I am inclined to regard as essential to the preservation of free mobility in the false joint of the great toe. Mr. Walsham points out in the work I have cited that the head of the first metatarsal bone is apparently enlarged, and that to its extreme prominence in hallux valgus, the associated bunion complications are due, therefore, in his opinion—an opinion I entirely endorse—the removal of this portion of bone is indicated. I can add my testimony to the extremely satisfactory results of this operation, not only as regards removing an unsightly and troublesome, as well as a very crippling deformity, but also in preserving a useful foot, or feet, for the deformity is commonly symmetrical. I perform the same operation in hallux flexus and rigidus.

With this deformity of the great toe, I—not inappropriately—come to the end of my lecture, not that I would for a moment pretend to have exhausted the subject of the correction of deformities by operative measures upon bones, only that I have dealt with those of them with which I am fairly familiar, having, in the thirty-two years I have been on the surgical staff of St. Bartholomew's Hospital, had considerable clinical experience in this field of operative surgery. I hope that what I have ventured to put before you has not seemed fragmentary or disconnected. I return you, Mr. President and gentlemen, my most cordial thanks for the attention you have bestowed upon me.

