Clinical Remarks

ON THE OPERATIVE TREATMENT OF FRACTURES.

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WHILE recent fractures of the femur can usually be readily and effectually dealt with by operation practically without risk, the surgical treatment of malunited fractures of this bone is often difficult in the extreme, and occasionally causes some anxiety because of the profuse hæmorrhage which may take place in the course of the operative procedures which are necessary for the restoration of bone to its normal form, or as near to it as possible. In a recent fracture, unless the comminution is excessive, the accurate coaptation of the edges of the fragments can always be effected with time and patience. Even if there is much comminution after wiring loose fragments together, narrow steel plates perforated by a number of holes can be screwed on to the main fragments, forming a rigid metal splint which retains the axes of the fragments securely immobile in the same straight line, and to these plates as well as to the main fragments the smaller pieces can be firmly secured.

In the case, however, of a fracture of the femur in which the fragments have united in a bad position you have usually to overcome the shortening of all the soft parts which have accommodated their length to the altered condition of the femur. Therefore you must have a junction which will hold securely in spite of considerable strain exerted upon it.

In some cases you may attempt to do this by so cutting the fragments that they to some extent dovetail into one another, but this is rarely applicable to fractures of the junction of the upper with the middle third, where the resisting ties lie almost entirely internal to the bone. It is surprising how much the soft parts will stretch, and how little they form an obstacle to reduction if enough force is employed. I have never seen any trouble arising from such stretching, and do not hesitate to exert a force sufficient to bring it about. I mention this as the danger of doing this has been used as an argument against operation by surgeons of eminence.

The simplest mode of dealing with these fractures would seem to be by cutting the bone transversely. This, however, is not often the best way, for the reason that it is difficult to keep two transverse vertical surfaces immovably in apposition by any mechanism, and because a large proportion of the fractures are spiral or oblique. Consequently, unless a considerable length of the bone is sacrificed only a proportion of its circumference may be obtained in the transverse section, and a secure junction is not so certainly ensured. Generally speaking, I have found an oblique section the most economical from the point of view of shortening, and most useful in enabling the surgeon to retain the surfaces immovably and securely on one another by screws. Much care is requisite to determine accurately the plane in which each fragment must be divided if an accurate junction is to be obtained.

Perhaps I can best illustrate this by the description of such a case. On March 25th, 1906, while in Cabul, the patient fell 40 ft., fracturing the left thigh and sustaining other injuries. A Bryant's splint was employed in the treatment of the fracture. I saw him on October 29th, 1906, seven months after the injury. He was on crutches. The left thigh was very deformed, and the limb was $3\frac{1}{2}$ in. shorter than its fellow. The leg below the seat of fracture was rotated outwards, so that the heel hitched behind the right leg and prevented the left leg being advanced in front of it. He was unable to bear any weight upon the left leg. The knee had become fixed.

The x-ray photograph as illustrated in Fig. 1 showed that, beside the deformity, there was some commi-

Fig. 1.—Left thigh, October 29th, 1906.

nation of the upper fragment. It seemed advisable to reduce the existing considerable brawny oedema and induration of the soft parts of the thigh, and to obtain some movement in the knee-joint before an operation was performed; consequently he was massaged vigorously for several weeks.

On December 5th the seat of fracture was exposed, and the bones were sawn through in two oblique planes. Before making the sections it was necessary to shell off masses of bone which surrounded the seat of the fracture. Two stout steel plates were then screwed on to the opposing fragments so that some of the screws perforated the oblique faces, which they held securely together. They were arranged vertically, and corresponded in position to the antero-lateral and postero-lateral aspects of the shaft. He was placed in a double Thomas's splint, and his convalescence was uneventful.

Fig. 2 represents the condition of the femur at the end of February, when the shortening of the limb was 1 in.,

which was compensated for very comfortably by an elevator $\frac{1}{2}$ in. in height. The femur was functionally perfect.

The next instance of malunion of the fragments of the femur to which I would call your attention is consequent on fracture through the epiphysal line of the head, or, as it is commonly called, separation of the upper epiphysis of the femur.

This fracture is very rarely recognized at the time the injury is sustained, for the reason that the soft blunt end of the fragment of the neck of the femur produces no great pain when the leg is moved, so much so that the patient will often walk about in comparative comfort with such a fracture, unconscious of having done other than strain the hip-joint somewhat.

The mobile head becomes displaced in the cavity, so that its convexity looks inwards, backwards, and downwards, while the stump of the neck ascends to a variable extent, retaining its contact with the anterior and upper portion of the surface of the epiphysal line. In proportion as the neck ascends, as the ilio-femoral ligament is relaxed, the femur rotates outwards and the stump of the neck projects forwards. This outward rotation is controlled solely by the resistance offered by the anterior ligament of the hip-joint. Secure union is effected by an abundant callus with great rapidity.

The patient suffers from two disabilities — an excessive outward rotation of the lower limb and a limitation in the flexion of the hip-joint, in which rotation takes place around an altered axis, which passes through the displaced head of the bone and the rotated trochanter. The limitation in flexion is consequent on the forward projection of the stump of the neck of the femur which impacts upon the margin of the acetabulum before the bone has reached its normal range of flexion.

I many years ago showed that flexion of the hip-joint was limited by the impact of the front of the neck of the femur against the acetabular margin, and that the range of flexion varied directly with any associated abduction, and indirectly with any adduction.

Originally it was—and, I believe is still—taught that flexion of the hip-joint is limited by the impact of the thigh against the abdominal wall, and, in consequence, the correct mechanics of fractures of the neck and dislocations of the head of the femur were wrongly described. The mode of production of these injuries is easily explained by the leverage action exerted by the femur in the manner indicated.

The normal situation of the areas of impact of the neck of the femur upon the acetabular margin are shown in a clear and unmistakable manner in the

bones of labourers who carry heavy loads on their backs during the performance of which they lock the femur on the innominate bone in a position of flexion and adduction.

While I have never had an opportunity of treating a recent case of separation of the upper epiphysis of the femur I have operated on many such fractures united in a bad position in order to remedy the disabilities complained of, namely, the excessive outward rotation of the femoral shaft, the limited flexion and to some extent the alteration in the axis of rotation at the hip-joint.

To do this the front of the capsule is exposed, and the anterior ligament cleared and defined. If the stump of the neck is excessively prominent, as it so usually is, enough is taken away from it to allow of a more or less complete range of flexion. The outward rotation of the shaft is overcome by lacing up the anterior ligament

transversely to the length of its fibres by silver wire, so approximating its points of attachment till the range of rotation of the limb equals that of its fellow.

This restoration of the rotation of the leg to its normal relationship to the other also reduces the deviation from the normal of the axis of rotation in the hip-joint. Instead of a limb which because of its rotation is brought forward with great awkwardness in walking, and whose range of adduction and flexion is practically *nil*, the patient has one that only requires the compensation for a very small amount of shortening by an elevator to render his locomotion comfortable and easy, and the leg to all

Fig. 2.—Left thigh, February 19th, 1907.

casual outward appearance normal in form and function.

As we are frequently asked for assistance in finding some place in which an idiot or mentally defective child can be placed and be morally trained and to a certain degree educated, attention may be directed to the Magdalen Hospital, Bath. This institution, devoted to the training of defective children, belongs to the Trustees of the Bath Municipal Charities, and now that certain structural alterations have been effected, it is, its medical officer considers, excellently suited to its purpose. Its site is on Combe Downs at an elevation of 600 ft. above sea level, facing south, and the grounds are sufficiently extensive for most of the work to be carried on out-of-doors. Children are admitted at any age from infancy to puberty, and trained on a modified kindergarten system, with results both physical and intellectual which the medical officer states fully justify the pains bestowed on the place.