ABDUCTION ARTHRODESIS OF THE HIP

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When visiting the orthopaedic department of the London Hospital in 1947 one of us was introduced to a method of arthrodesis of the hip joint, sometimes used in difficult cases by Watson-Jones and Osmond-Clarke, which is little known and may not have been recorded in the literature. In one patient with an ununited fracture of the femoral neck the avascular head was excised and the upper part of the greater trochanter, with the stump of the neck, was freshened and placed in the raw acetabulum with the limb in 45 degrees of abduction, the femur being divided at a lower level after three weeks so that the shaft could be adducted to the neutral position. The same procedure of securing fusion by fixing the limb in wide abduction after denuding the articular surfaces, and later correcting the excessive abduction by osteotomy, had been used by Watson-Jones in congenital dislocations where apposition between the femoral head and pelvis could be achieved only in the widely abducted position, and by Osmond-Clarke in some cases of tuberculosis of the hip when there had been extensive destruction of the femoral head and neck.

During the last four years the writers have found this operation of considerable value in a number of conditions affecting the hip joint. They believe that the procedure will prove of value in all parts of the world and more especially in Africa and other countries where patients often delay many months before seeking medical aid.

Indications—The operation is worth considering in the following conditions: 1) ununited fracture of the femoral neck in younger patients; 2) certain cases of septic arthritis of the hip which have not responded to chemotherapy, immobilisation or minor exploratory operations; or in which the head and neck of the femur have been destroyed; 3) tuberculosis of the hip with discharging sinuses which have not responded to more conservative methods of treatment; 4) quiescent tuberculosis when the femoral head and neck are eroded to such an extent that other methods of arthrodesis are rendered difficult; or 5) old unreduced dislocation of the hip when it proves impossible to reduce the dislocation at operation before proceeding to fuse the joint.

TECHNIQUE OF OPERATION

First stage—With the patient on an orthopaedic table, the hip joint is exposed through an anterior Smith-Petersen incision, the rectus femoris being retracted medially or laterally as desired. After removing the head, or head and neck, of the femur, sequestra, diseased bone or infected granulation tissue, the acetabulum and greater trochanter are raw with gouge and chisel. The limb is then abducted 45 degrees and the upper end of the shaft of the femur is placed in the acetabulum. In some cases this manoeuvre is facilitated by first placing a chisel in the upper part of the acetabulum and using it to lever the upper end of the shaft into position while the limb is slowly abducted. Bone chips cut from the anterior part of the iliac crest are used to fill the remaining space in the acetabulum. After closure of the wound a double plaster hip spica is applied with the limb still in abduction.

Second stage—The second stage of the operation is undertaken three to four weeks later. With the patient on an orthopaedic table a circular cuff of plaster is removed, of sufficient extent to expose the upper third of the femur. Through a lateral incision the femur is divided about two inches below its upper end. The leg is adducted to lie between the neutral position and 5 degrees of abduction. The wound is closed and the hip spica is completed.

Post-operative treatment—In all patients with infected sinuses penicillin is given twice a day

for about three weeks. After three months the plaster is removed and if clinical and radiographic examination show firm fusion of the hip and union of the osteotomy the patient is allowed up.

RESULTS

Of sixteen patients operated on in the last four years one died after the operation. In this case a modified operation had been done as a life saving measure. In fourteen patients firm fusion was obtained, with complete healing of sinuses when present. The remaining patient had had two previous operations and it was not possible to fit the greater trochanter firmly into the acetabulum; fibrous ankylosis only was obtained. Of four other cases not included in this series because the case records are not available, one died from tuberculous pyonephritis five days after operation.

CASE REPORTS

Case 1. *Ununited fracture of femoral neck*—A man aged forty years was admitted with a history of injury to the hip three months previously. Radiographs showed non-union of a femoral neck fracture with avascular necrosis of the head and upward displacement of the shaft of the femur (Fig. 4). The first stage of abduction arthrodesis was carried out in January 1951. Osteotomy of

FIG. 1
FIG. 2
FIG. 3
Diagrams to illustrate the principle of the operation. Figure 1—Before operation; absorption of head and neck of femur. Figure 2—After first-stage operation. Figure 3—After second-stage operation.

the femoral shaft was undertaken one month later. Three months later both hip and osteotomy were firm (Fig. 5). The patient had one and a half inches of shortening which was corrected by building up the shoe.

Case 2. *Osteomyelitis involving the femoral head*—A girl aged eight years was admitted with osteomyelitis of the whole femoral shaft. There was a pathological dislocation of the hip with a fracture-dislocation of the capital epiphysis; the head was sequestered (Fig. 6). A sinus was present on the lateral aspect of the thigh four inches above the knee joint. This healed after a small exploratory operation and prolonged chemotherapy. The first stage of abduction arthrodesis was carried out in June 1950 and the second stage one month later. Three months later both hip and osteotomy were firm. One year later the patient was in excellent health and is walking well with a two-inch lift to the shoe.

Case 3. *Septic arthritis of hip*—A girl aged fifteen years was admitted with a discharging sinus over the hip. Radiographs showed complete destruction of the head and neck of the femur (Fig. 8). Exploration of the sinus and subsequent chemotherapy failed to bring about healing of the sinus. The first stage of abduction arthrodesis was done in May 1948. Owing to insufficient abduction the upper end of the femur slipped out of the acetabulum. It was replaced at a second operation. The second-stage operation was carried out one month later. Three months later the hip was firmly fused and the sinus healed (Fig. 9). Three inches of shortening was corrected by a patten on the shoe. The patient returned the following year with a soft-tissue swelling on the front of the thigh just below the groin; at operation a few small sequestra were removed. Healing occurred and there has been no recrudescence of the infection.

FIG. 4

FIG. 5

Case 1. Figure 4—Before operation. Figure 5—Three months after second-stage operation.

FIG. 6

FIG. 7

Case 2. Figure 6—Before operation. Note pathological dislocation with sequestration of femoral head. Figure 7—One year after abduction arthrodesis.

FIG. 8

FIG. 9

Case 3. Figure 8—Before operation. Destruction of head and neck of femur after septic arthritis.
Figure 9—Three months after second-stage operation.

FIG. 10

FIG. 11

Case 5. Figure 10—Before operation. Figure 11—Three months after second-stage operation.

Case 4. Tuberculous hip with infected sinuses—A girl aged fourteen years was admitted with tuberculosis of the right hip. Ilio-femoral arthrodesis was performed after a period of rest, but four months later the wound broke down in two places. Repeated exploration with removal of numerous small sequestra failed to heal the sinuses. One year after the initial operation the first stage of abduction arthrodesis was undertaken and was followed by osteotomy three months later. Within six months the sinuses were completely healed and the hip firmly fused. One year later her general condition was excellent, the wound completely healed and the hip firm. Five inches of shortening was corrected by a patten.

Case 5. Healed septic arthritis of hip—A woman aged twenty years was admitted with a history of septic arthritis of the hip in childhood; she complained of pain in the hip with instability. Radiographs showed absence of the femoral head and neck with upward displacement of the greater trochanter (Fig. 10). Abduction arthrodesis was undertaken in two stages. Three months later the hip was firmly fused and the osteotomy united (Fig. 11). When last seen nine months afterwards she was walking well with a raised shoe.

Case 6. Quiescent tuberculosis with erosion of head and neck of the femur—A boy aged thirteen years was admitted with a history of tuberculosis of chest, spine and right hip of eighteen months duration, during which time he had undergone continuous conservative treatment elsewhere. Examination on admission showed advanced healing of the lesions in the lung and spine but there were three discharging sinuses round the hip. These healed completely after a six-week course of streptomycin. Radiographs at this time showed absorption of the femoral head and neck. Abduction arthrodesis was carried out in two stages. Three months later the hip and osteotomy were firm. One and a half inches of shortening was corrected by building up the shoe. He was discharged one month later walking well with one stick.

Case 7. Unreduced dislocation of the hip—A boy aged sixteen years was admitted with an unreduced pathological dislocation of the right hip which occurred during an attack of cerebrospinal meningitis eighteen months previously. Open reduction was attempted soon after his admission but it proved impossible to reduce the femoral head into the acetabulum. The first stage of abduction arthrodesis was therefore undertaken and was followed by osteotomy four weeks later. After four months both hip and osteotomy site appeared to be firm, and the patient was allowed up. But after a further two months the osteotomy site refractured and a hip spica plaster was therefore applied for a further three months. At the end of this time the fracture was firmly united. Three-quarters of an inch of shortening was corrected by building up the shoe and he was discharged one month later walking well with the aid of a stick.

Case 8. Ununited fracture of femoral neck—A woman aged fifty years was admitted with an ununited fracture of the femoral neck. At operation the femoral head was removed and the first stage of abduction arthrodesis carried out. Osteotomy of the femur was done three weeks later. After four months the osteotomy was not yet united and a further plaster spica was applied. Six months after operation the arthrodesis was firm and the osteotomy united. She walked well with sticks; one and a half inches of shortening was corrected by a raised shoe.

Case 9. Osteomyelitis of neck of femur—A boy aged nine years was admitted with osteomyelitis of the neck of the left femur. His right leg had been amputated below the knee for osteomyelitis of the tibia. Radiographs showed marked destruction of the femoral head and neck. There were no sinuses. After a prolonged course of chemotherapy operation was undertaken. The remnants of the head and neck were removed and the greater trochanter was placed in the acetabulum, the limb being abducted 45 degrees. Osteotomy of the shaft was done two and a half months later. Four months after the second stage the hip was firm and the osteotomy united. He walked well with crutches. He has not yet reported for fitting of an artificial limb.

Case 10. Osteomyelitis of neck of femur—A boy aged thirteen years was admitted with acute osteomyelitis of the right femoral neck. In spite of immobilisation and prolonged chemotherapy his condition slowly deteriorated. Radiographs four months after admission showed that the femoral head had sequestered. At operation the sequestrum was removed and the acetabulum cleared of granulation tissue. The greater trochanter was rawed and placed in the acetabulum with the limb abducted 45 degrees. A plaster spica was applied. At the end of the operation his condition was fair, but he collapsed and died suddenly three hours later.

Case 11. Osteomyelitis of neck of femur—A girl aged six years was admitted with quiescent osteomyelitis of the neck of the right femur, of the left scapula and of the left side of the mandible. Radiographs showed marked destruction of the head and neck of the femur (Fig. 12). There was a 45-degree flexion contracture of the hip. Abduction arthrodesis was carried out in two stages. Three months later both hip and osteotomy were firm (Fig. 13). She left hospital walking well, with one and a half inches of shortening. Recently a stapling operation has been done on the left lower femoral epiphysis.

FIG. 12

FIG. 13

Case 11. Figure 12—Before operation. Figure 13—Three months after abduction arthrodesis.

FIG. 14

FIG. 15

Case 13—Long-standing tuberculous arthritis of hip. Figure 14—Before operation. Figure 15—Four months after operation, shortly before removal of plaster. The operation was unsuccessful in securing bony fusion.

Case 12. *Osteomyelitis of upper end of right femur*—A girl aged sixteen years was admitted with quiescent osteomyelitis of the upper end of the femur, causing almost complete destruction of the head and neck. Abduction arthrodesis was carried out in two stages. Within three months there was sound fusion of the hip and union of the osteotomy. She was discharged from hospital with a raised shoe to correct two inches of shortening.

Case 13. *Tuberculosis of hip with infected sinus*—A girl aged nineteen years was admitted with a discharging sinus and marked soft tissue swelling over the left greater trochanter. She had had intermittent treatment for the hip over a period of five years, including prolonged conservative treatment and two operations of the Brittain type in an attempt to fuse the joint (Fig. 14). On admission the hip was immobilised and she was given a three-month course of streptomycin. At the end of this time the sinus was completely healed and her general condition was good. At the first stage of abduction arthrodesis it was not possible to obtain a firm fit of the trochanter in the acetabulum because of the gross destruction of the head and neck and two previous operations. Four weeks after the first operation the femur was manipulated into a position of 20 degrees abduction (Fig. 15). Three months later, when the plaster was removed, there was no bony fusion. There was three inches of shortening. Her general condition was good and it was decided to accept fibrous ankylosis of the hip. She is now walking well with a raised shoe.

Comment—The writer believes that in such a case bony fusion may be obtained by fitting the greater trochanter into an excavation made in the ischium just below the acetabulum; this would enable a firm fit to be obtained. It has been attempted in a recent case, similar to this one.

Case 14. *Tuberculosis of the hip with infected sinus*—A boy aged fourteen years was admitted with a four-year history of pain in the left hip. He had been treated conservatively in Tanganyika. On admission he had a discharging sinus over the greater trochanter. Radiographs showed complete destruction of the head and neck of the femur. After a preliminary course of chemotherapy abduction arthrodesis was carried out in two stages. After three months the hip was not quite firm; another plaster spica was applied. Two months later fusion was sound. The sinus was healed and he was able to walk well with a patten to correct five inches of shortening. Eighteen months after operation he returned with a small sinus anterior to the hip. At operation a small amount of superficial necrotic material was removed. The sinus healed rapidly. He was advised to return later for leg equalisation.

Case 15. *Tuberculosis of hip with infected sinuses*—A boy aged twelve years was admitted with quiescent tuberculosis of the chest and of the lumbar spine, and active disease of the right hip. There were four discharging sinuses round the joint. He had been treated conservatively for one year before admission here. Radiographs showed marked erosion of the acetabulum. The femoral head was displaced into the pelvis and appeared to be sequestered. The hip was immobilised and a two-month course of streptomycin was given. At the end of this time his condition was much improved but the sinuses were still discharging slightly. The first stage of abduction arthrodesis was undertaken. At operation the sequestered femoral head was removed from the pelvis via the joint. The second stage was done six weeks after the first. Three months later both hip and osteotomy were firm. He left hospital with a raised shoe to correct one inch of shortening. His condition at that time was good, the sinuses were completely healed, and he walked well.

Case 16. *Healed septic arthritis of hip*—A girl aged twenty years was admitted with a history of an acute febrile illness in early childhood, resulting in a marked limp and two inches of shortening of the lower limb. Radiographs showed an upward dislocation of the hip and marked deformity of the femoral head and neck, due presumably to septic arthritis of infancy. The first-stage operation was undertaken soon after her admission. It was found possible to lever the greater trochanter downwards into the acetabulum. Osteotomy of the femur was done three weeks later. After three months the osteotomy did not appear quite united and a further plaster spica was applied. Two months later both hip and osteotomy site were firm. There was no shortening of the leg. She is now walking well.

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