PARALYTIC DISLOCATION OF THE HIP

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The hip is one of the joints at which instability cannot be controlled adequately by splinting. It is therefore important that disability resulting from paralysis should not be further aggravated by subluxation or dislocation if this can be either avoided or corrected. In the older patient stability can, in favourable circumstances, be obtained by arthrodesis of one hip, but in young children this is not practicable, and it is in young children that this problem is particularly important, because it is only in young children that dislocation develops (Blundell Jones 1954).

This paper refers to the dislocations developing in consequence of flaccid paralysis and is not concerned with the subluxation commonly found in association with spastic paraplegia; it is concerned only with the mechanics of dislocation and with the methods that may be used to secure an immediate reduction. It is not concerned with the second factor that is of great importance in all dislocations in infants, namely the subsequent growth of the hip joint and the bones comprising it.

MECHANISM OF DISLOCATION

The dislocation has been described as developing in two ways. Blundell Jones (1954) considered coxa valga important. Watson Jones (1926) attributed the dislocation to the development of an adduction contracture. In fact the mechanism of development of dislocation by both of these methods is the same. The nearer the angle between the neck of the femur and the horizontal of the pelvis approaches 90 degrees the more unstable will the hip become. This might well be called the "effective valgus" of the femoral neck (Fig. 1) and will be equally damaging whether caused by true coxa valga, obliquity of the pelvis or adduction of the hip; but obviously the method of treatment will vary in each instance, and for the purposes of description we may consider two types—true paralytic dislocation and postural paralytic dislocation.

TRUE PARALYTIC DISLOCATION

In this condition the immediate cause of the dislocation lies within the hip itself. The muscles are paralysed, the ligaments stretched and excessive coxa valga is present; in fact the neck and shaft may be in the same straight line. These circumstances inevitably lead to instability with progressive subluxation leading

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to dislocation and deformity of the acetabulum. These changes are secondary, and are reversible up to a certain point, but beyond this they become established. For this reason it is important that the deformity be corrected early. If a policy of “wait and see what happens” is followed, by the time the result is seen it will be too late to do anything about it. Splinting has little practical value. The changes leading to the dislocation are not self-correcting; so, although the dislocation can be reduced and the reduction maintained by a splint, when the splint is removed the dislocation will recur. Nevertheless, if the child is unfit for operation intermittent splinting with the leg in abduction will help to reduce the damage to a minimum until such time as operation becomes possible.

Of the three factors mentioned as the cause of instability—paralysis, ligamentous laxity and coxa valga—we can do nothing useful about the first two, but fortunately we can easily correct the last with great benefit, as has been shown by Blundell Jones (1954) who corrected the valgus by an osteotomy at the base of the neck. Whether or not anteversion plays a part in this condition is of only minor importance, but the question of rotation is important and should be taken into consideration.

A paralysed and dislocated hip will often lie in lateral rotation. The reason for this is shown in Figure 2. The axis of rotation of the femur extends from the centre of the head of the femur to the centre of the knee joint. As is shown in the diagram, the attachment of the psoas to the lesser trochanter lies outside this axis; so the psoas muscle is a medial rotator of the normal hip. If the neck of the femur is valgus or anteverted the lesser trochanter will be approximated to this axis and may even come to lie medial to it, so that the action of the psoas will be reversed and it will become a lateral rotator of the hip. If the head of the femur is dislocated from the acetabulum it will no longer be one end of the axis, and the psoas will then be a strong lateral rotator. If this faulty mechanism is corrected by reduction of the head of the femur into the acetabulum and an adduction osteotomy to correct the neck-shaft angle, the normal action of the psoas will be restored and if it is functioning at all it will act as a medial rotator. On the other hand it may be paralysed but contracted, in which case it will produce a fixed medial rotation deformity which will be a handicap to the patient unless it too is corrected by a rotation osteotomy. That this mechanism exists can easily be demonstrated at the time of operation, and the result is improved if it is allowed for by combining 50 degrees of lateral rotation of the lower fragment with the adduction. The neck of the femur is unsuitable for this type of osteotomy, which should be carried out as high as possible in the shaft: although this does not produce such a neat appearance radiographically it has the advantages of allowing angulation and rotation at the same site. Since the correction of angulation and rotation must be carried out accurately according to a previous assessment, the osteotomy must be fixed with a plate and four screws.
Before any osteotomy is undertaken the deformity of the hip must be corrected and full abduction must be obtained. This is done most satisfactorily by gradual reduction on a frame. This reduction will ensure complete stretching of the adductor muscles, which may be contracted. Sometimes the adductor contracture will be such that a tenotomy will be necessary before adequate correction can be obtained. If it is necessary to get full medial rotation, as is sometimes the case, this can be done by serial plaster spicas applied with the
aid of anaesthesia, although force must never be used as the bones are often brittle. Unless a satisfactory position can be obtained in this way it is useless to proceed, but it is worth bearing in mind that an adduction osteotomy produces relative lengthening of the adductor muscles, and fortunately this often means that the ultimate position will be better than might have been expected from the preliminary manipulations.

Fortunately, in paralytic dislocations of the hip, unlike congenital dislocation, the limbus is not inverted and there is no intra-acetabular obstruction. For the limbus to be inverted there must, of necessity, be oft-repeated active flexion and extension of the dislocated hip. This active movement being impossible in the paralysed limb, the limbus remains everted.

Examples of this type of dislocation and its correction are shown in Figures 3 to 8.

ILLUSTRATIVE CASES

Case 1 shows the true paralytic dislocation of the left hip in a boy of nine. His right leg was normal. Attempts to reduce the dislocation by gradual abduction on a frame failed even after an adductor tenotomy had been carried out (Fig. 4), and a suitable position could be obtained only by putting the hip into full medial rotation under anaesthesia and immobilising it in this position in a plaster spica for two weeks before carrying out a rotation-adduction osteotomy (Fig. 5).

Case 2 illustrates a much simpler problem in a girl of ten (Fig. 6). This dislocation could be reduced easily without special manoeuvre (Fig. 7), but when reduced the hip was extremely unstable. This instability was completely overcome by rotation-adduction osteotomy (Fig. 8).

Case 3 concerns the dislocated hips of a child with a meningo-myelocele (Fig. 9). It is not uncommon in this condition to find that both hips are dislocated. These dislocations are not due to teratological factors, but seem to have the characteristics of a true paralytic dislocation. The dislocation can be easily reduced by abduction on a frame followed by full medial rotation in plaster, the position being maintained by rotation-adduction osteotomy (Fig. 10).

POSTURAL PARALYTIC DISLOCATION

This poses a very much more difficult problem. The dislocation results from obliquity of the pelvis. This obliquity may be caused by factors above or below. When the cause lies above it is probably a structural scoliosis which is likely to be progressive, and even if it can
FIG. 6
Case 2—True paralytic dislocation of the hip in a girl of ten.

FIG. 7
Case 2. Figure 7—Radiograph showing the hip reduced. Figure 8—After rotation-adduction osteotomy. The hip is now stable.
Case 3—True paralytic dislocations due to a meningocoele.

Case 3—After reduction on a frame and rotation-adduction osteotomies.
be corrected it is most unlikely that the correction can be maintained. In such unfavourable circumstances (Fig. 11) it is better to leave the dislocation untreated.

But it must be borne in mind that even if the obliquity is due to factors below, there will always be a scoliosis, and if this has been in existence long enough it will develop structural and irreversible changes. This type of secondary structural scoliosis will not in itself be progressive, and, if the factors causing it—namely those that are producing the pelvic obliquity from below—are corrected, then increase in the curvature will be arrested and it is likely that some correction will take place.

The usual cause of pelvic obliquity produced from below is an abduction-flexion contracture of one hip with consequent dislocation of the other (Fig. 12). It is unfortunate that the hip which dislocates is usually the less severely affected of the two. The size and texture of the two femurs shown in Figure 12 indicate that this is the case here. This makes it a matter of great importance that the deformity shall not be allowed to persist.

Although the dislocation results from the excessive contractures of the opposite hip, use can be made of these contractures to produce stability of the joint, in just the same way as a contracture of the calf is the greatest help in producing stability in an otherwise paralysed limb. It is important that the contractures are not ruthlessly destroyed by soft-tissue release operations but rather that the deformities are corrected by osteotomy to the exact amount of angulation estimated beforehand. So far as the abduction contracture is concerned this can easily be corrected by osteotomy, but only a small amount of flexion can be corrected in

FIG. 11
Pelvic obliquity and subluxation of the left hip resulting from a structural scoliosis.
FIG. 12
Case 4—Pelvic obliquity resulting from abduction-flexion contracture of the right hip. This has caused a subluxation of the left hip. The different texture of the two femora indicates that the paralysis was less on the left than on the right.

FIG. 13
Case 4—After correction of the deformity on the right by osteotomy. The position of the left hip is much improved.
Case 5—Appearance like that in Figure 12; the paralysis was almost complete on both sides.

Case 5—After bilateral rotation-adduction osteotomies.
this way. When the flexion contracture is excessive it must be corrected by a soft-tissue slide, but great care must be taken to see that it is not overcorrected even at the risk of the operation's having to be repeated later. A small flexion contracture can be of great value in a paralysed limb, for it is the only available means of swinging the limb forwards; in this respect it is infinitely better than any external apparatus.

ILLUSTRATIVE CASES
Case 4 is one in which a flexion-abduction contracture on the right had produced pelvic obliquity so that the left hip, which was on the less paralysed side, was subluxated (Fig. 12). Correction of the deformity on the right by means of an osteotomy has greatly improved the position on the left (Fig. 13).
Case 5 concerns the hips of a child of six with almost complete paralysis of both legs and an abduction contracture of the right hip causing dislocation of the left (Fig. 14). In view of the extensive paralysis rotation-adduction osteotomies were carried out on both hips (Fig. 15).

DISCUSSION OF RESULTS
It is sometimes questioned whether the correction of dislocation in such hips is of more than academic interest, or whether it is of some practical value to the patient. Only five of the eight patients treated have been illustrated here. The other three have been similar and it can be said with certainty that these patients have benefited from the operation in consequence of the improvement—however slight—in the stability of the hips. The patient in Case 1 is now able to discard his caliper for long periods, and the shortening of his leg, though still considerable, is less. In Case 2 the hip is no longer slipping in and out with every stride, and presumably the risk of subsequent arthritis and pain have at least been reduced. The patients in Cases 4 and 5 were children who at the ages of five and six years old respectively had never walked despite prolonged treatment since the onset of paralysis. Patient 4 can now use her left leg with only a below-knee iron and with a caliper on the right leg, and can walk with sticks. Patient 5 can, with two calipers aided by slight bilateral flexion contractures of the hips, walk without sticks across the gymnasium, but usually uses sticks. Despite the lateral rotation osteotomies he is, four years after operation, beginning to walk with the limbs turned medially.
From these few illustrative cases it seems that when correction of a subluxation or dislocation can be obtained easily by simple positioning of the limb the manoeuvre is well worth while, but if the reduction cannot be obtained easily it is better that it should not be attempted: the bones in such cases are often very fragile and any use of force is likely to lead to trouble. When the pelvic obliquity is due to spinal deformity it is unlikely that treatment will be of value.

SUMMARY
1. Two types of paralytic dislocation of the hips are discussed.
2. The mechanics of dislocation and the methods of reduction are described, with emphasis on the importance of maintaining or increasing stability where possible.

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REFERENCES