THE AFRICAN NEONATAL HIP AND ITS IMMUNITY FROM CONGENITAL DISLOCATION

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The hips of twenty full-term African neonates have been examined in detail to determine any anatomical factors which might explain the difference in the incidence of congenital dislocation of the hip in the African and in the Caucasian. Measurements included the degree of anteverision of the femoral neck and the acetabulum and the diameter and depth of the acetabulum. The acetabulum tended to be deeper and to vary within a much narrower range than that reported for Caucasians, lending indirect support to the theoretical role of acetabular dysplasia in the aetiology of congenital dislocation of the hip. Measurements of the anteverision of the acetabulum and femoral neck were similar to those given for Caucasians.

It is well recognised that certain racial groups have an exceedingly low incidence of congenital dislocation of the hip. One such group is the African. In a large orthopaedic department serving a vast native population we have encountered only one patient with this condition in recent years. He was a three-year-old with bilateral dislocation who had no other congenital abnormalities and, as far as could be ascertained, had been born after a normal pregnancy and delivery.

Huckstep (1970) reported bilateral congenital dislocation of the hips in African twins, both of whom had associated congenital abnormalities of the musculoskeletal systems. More recently Roper (1976) reported a typical unilateral dislocation in an African male infant. No explanation for this low incidence has been proffered, although it has been suggested that the traditional method of carrying children on the back with the hips flexed and abducted—the Lorenz position—is a factor in stabilising potentially unstable hips. That this is fallacious was demonstrated by Edelstein (1966), who examined 16678 newborn African infants and detected only two with a positive Ortolani sign; both stabilised spontaneously.

More recently Pompe Van Meerdervoort (1977) in a similar survey of 10000 infants noted an incidence of unstable hips of approximately 10 per cent of the average reported for Caucasians. On a much smaller scale we have examined all the neonatal deaths during a six-month period and failed to detect any instability of the hip.

Much information is now available on the normal development and anatomy of the hip in Caucasians and of many dissections of dislocated hips. In this study similar dissections have been performed in African neonates in order to determine any anatomical factors which might explain the difference in the incidence of congenital dislocation of the hips in Africans and Caucasians.

MATERIAL AND METHODS

Twenty full-term African neonates were obtained, all of whom had died within hours of birth. In no case were there any abnormalities of the musculoskeletal system or any other congenital malformations.

The stability of the hips was assessed and the range of movements measured and recorded. The muscles were then excised leaving the capsules intact and the range of movement again determined. In this way any limitation of movement due to short or tight muscles could be appreciated.

The capsules were next divided circumferentially and the ligamentum teres excised. The degree of acetabular anteverision was measured according to the method and in the position recommended by McKibbin (1970). It was apparent that the head of the femur did not always sit symmetrically on the femoral neck and that there was often retroversion of the head relative to the neck. The measurement of anteverision of the femoral neck proved to be the most difficult and almost certainly the least accurate because the femoral neck in the neonate is extremely short, being only 3 to 4 millimetres superiorly and 5 to 6 millimetres inferiorly. Many methods which may be entirely suited to these measurements in the adult are not applicable to the neonate. Nevertheless, anteverision of the femoral neck was measured by a slight simplification of the method used by Kingsley and Olmsted (1948). The angle between the head and the neck proved impossible to measure accurately, and finally it was noted only whether the head appeared to be anteverted or retroverted relative to the femoral neck.

The diameter of the acetabulum was measured with calipers and the maximum depth of the acetabulum with a modified depth gauge.

RESULTS

All the hips examined were clinically stable. In each neonate the hips lay in varying degrees of flexion and lateral rotation. Extension from the position of flexion deformity was limited, conspicuously so in the three breech presentations. Flexion was unrestricted. Lateral
Table I. Acetabular anteversion and coexisting femoral anteversion in African neonates

<table>
<thead>
<tr>
<th></th>
<th>Neck-shaft angle (degrees)</th>
<th>Acetabular anteversion (degrees)</th>
<th>Femoral neck anteversion (degrees)</th>
<th>Instability index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>125–140</td>
<td>7–22</td>
<td>10–27</td>
<td>17–49</td>
</tr>
<tr>
<td>Mean</td>
<td>135</td>
<td>17</td>
<td>22</td>
<td>34</td>
</tr>
</tbody>
</table>

Table II. Acetabular diameter and depth in African neonates

<table>
<thead>
<tr>
<th></th>
<th>Diameter of acetabulum (a²)</th>
<th>Depth of acetabulum (a₂)</th>
<th>a₂/a₁ × 100</th>
<th>41–52 per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>14–19 millimetres</td>
<td>7–9 millimetres</td>
<td>41–52 per cent</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>17 millimetres</td>
<td>8 millimetres</td>
<td>46 per cent</td>
<td></td>
</tr>
</tbody>
</table>

rotation was full to 90 degrees but medial rotation past the neutral position was not possible.

The position of the hips and the range of movement did not increase after stripping the muscles, suggesting that the iliopsoas was not a factor in limiting extension. Incision of the anterior capsule, however, did allow full extension.

Table I shows the measurements of acetabular anteversion, femoral neck anteversion and the sum of these, the instability index. The depth of the acetabulum a₁ expressed as a percentage of its maximum width a₂ is given in Table II; the deeper the acetabulum the higher the ratio of a₂/a₁. In a perfectly hemispherical acetabulum the ratio is 50 per cent.

DISCUSSION

The aim of this study was to determine any anatomical factors in the neonatal African hip which might explain the almost complete immunity to congenital dislocation, even though the incidence of other congenital anomalies, such as talipes equinovarus, is as high, if not higher, than that of Caucasians (Pompe Van Meerdervoort 1977).

Many theories have been put forward concerning the aetiology of congenital dislocation of the hip but the present concepts have perhaps best been summarised by Wynne-Davies (1970) who believes that there are two aetiological groups—one with generalised joint laxity, responsible for a high proportion of the neonatal cases, and the other with acetabular dysplasia which is inherited as a multiple gene system and is largely responsible for cases diagnosed late. Evidence favouring the latter theory includes an extensive survey of twins, a high familial incidence and the observation that the parents of children with congenital dislocation have a tendency to acetabular dysplasia as determined by the

![Graph](image_url)

Comparison of acetabular shape (depth/width x 100) between African and Caucasian neonates.
CE angle of Wiberg (Wilkinson and Carter 1960; Wynne-Davies 1970). Since this study was purely anatomical, our findings can be related only to the concept that acetabular dysplasia is of aetiological importance in congenital dislocation of the hip.

Le Damany (1908) suggested that there is normally an inverse relationship between the degree of acetabular anteversion and that of femoral anteversion. McKibbin (1970) failed to confirm such a correlation. In his series acetabular anteversion in Caucasians varied between \(-2\) degrees and \(+16\) degrees (mean \(7\) degrees) and femoral anteversion was \(15\) to \(47\) degrees; in this study acetabular anteversion in Africans was \(7\) to \(22\) degrees (mean \(17\) degrees) while femoral anteversion was \(10\) to \(27\) degrees (mean \(22\) degrees) (Table 1), the latter being a narrower range than McKibbin's. In addition, Le Damany initiated the concept of an incompatibility index by postulating that if the reciprocal relationship between femoral and acetabular anteversion broke down and the combination of these two readings was greater than sixty, then instability of the hip would result. In this series the instability index was between seventeen and forty-nine, almost within the range given for Caucasians of twenty to fifty-eight. Criticism could be levied against any conclusions drawn from these results because each of the measurements was made with the pelvis in the anatomical position and the femur in neutral. This is necessary in order to standardise and compare results but they are not necessarily the position in utero. Nevertheless, the similarity between the measurements in the African compared to the Caucasian make it difficult to implicate either femoral or acetabular anteversion in the aetiology of congenital dislocation of the hip.

Rålīš and McKibbin (1973) confirmed Le Damany's observations that the acetabulum was most shallow at birth and the joint therefore at its most unstable and susceptible to extrinsic factors which in combination might produce a dislocation. They suggested that the hips were shallow at birth because of the increased mobility required at this time. If acetabular dysplasia, as reflected by a shallow acetabulum, is an important factor in congenital dislocation then African neonates with their very low incidence should in theory have deeper acetabula than Caucasians. This is indeed the case, as shown by the comparison of the acetabular measurements of Rålīš and McKibbin with those in this study (Fig. 1). The African neonatal hip was deeper more frequently and varied within a much narrower range than the Caucasian hip. Six of the fourteen Caucasian acetabula were shallower than any of the African.

Although the numbers are small, this comparison certainly lends indirect support to the theory of acetabular dysplasia in congenital dislocation. Further evidence may soon be provided by our radiological survey of acetabular measurements in the African adult as reflected by the CE angle of Wiberg.

REFERENCES


