PREMATURE CLOSURE OF THE TRIRADIATE CARTILAGE

REPORT OF A CASE

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A case of early closure of the triradiate cartilage, probably secondary to neonatal septic arthritis of the right hip, is reported. Tomograms of the hip showed the triradiate cartilage closed posteriorly, with the anterior portion still open. These findings were confirmed at operation. An arthrogram and a CT scan of the right hip showed subluxation of the femoral head. This unique complication, after an episode of septic arthritis of the hip, has not before been reported in the literature.

It is the purpose of this article to report a unique case of partial premature closure of the triradiate cartilage, after an episode of septic arthritis of the hip in the neonatal period.

Septic arthritis of the hip in the newborn is often unrecognized when there are other serious problems (Obletz 1960, 1962). Despite the widespread use of antibiotics and surgical decompression, it can result in severe and permanent crippling.

The complications after an acute septic arthritis of the hip include: dislocation of the joint due to distension of the capsule by pus under pressure; destruction of the articular cartilage with subsequent fusion of the hip; avascular necrosis of the femoral epiphysis; sequestration of the femoral epiphysis; damage of the proximal femoral growth plate with subsequent disturbance in growth; and coxa magna (Eyre-Brook 1960; Lloyd-Roberts 1960; Griffin 1967; Chacha 1971; Gillespie

1973; Howard, Highgenboten and Nelson 1976; Morrey, Bianco and Rhodes 1976).

Involvement of the triradiate cartilage after septic arthritis of the hip has not been reported. Premature closure of the triradiate cartilage after an acetabular injury appears to be quite rare (Rodrigues 1973; Hallel and Salvati 1977). Only six cases followed to adulthood have been reported in the literature.

CASE REPORT

An 18-month-old Caucasian girl was first seen at our institution for evaluation of a supposed congenital dislocation of the right hip.

She had been born after a 33-week gestation, by vaginal delivery with vertex presentation. Due to respiratory distress, she was transferred to the intensive care unit; positive blood cultures of *Staphylococcus aureus* were obtained, and the diagnosis of septicaemia arising from the umbilical cord was made. She was treated with intravenous antibiotics and during the course of treatment no abnormalities of the right hip were detected. On discharge her hip was

Fig. 1

Fig. 2

Figure 1—Anteroposterior radiograph at 12 months of age. The triradiate cartilage is closed, the acetabulum is small and shallow. The femoral epiphysis is absent and the femoral neck is wide. Note the decreased size of the right pubis and ischium when compared to the left side.

Figure 2—Radiograph at 18 months of age, with similar findings.

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recorded as normal. At six months of age the diagnosis of dislocation of the right hip was made. She was treated by traction followed by an attempt at closed reduction and immobilisation in a spica cast for five months.

At her first physical examination in our institution her right hip showed 50 degrees of flexion contracture and 20 degrees of abduction contracture. Medial and lateral rotation were absent. A positive Galeazzi sign was present with asymmetry of the gluteal and thigh folds.

The patient's radiographs were reviewed. At one year of age (Fig. 1) there was obvious subluxation of the right hip, closure of the triradiate cartilage, absence of the femoral epiphysis, and a deformed femoral neck. Similar findings were seen at 18 months (Fig. 2).

After four weeks in skeletal traction, an adductor myotomy was performed, and an arthrogram showed a hypertrophic femoral head and a shallow acetabulum (Fig. 3). She was then placed in split Russell traction for another 10 days. No attempt to reduce the hip was made. At discharge she was placed in a total-body polypropylene splint with the hip in 35 degrees of abduction and 10 degrees of flexion. She was allowed to walk, fully bearing weight.

Fig. 3

Arthrogram at 18 months of age. The hip is subluxated, the acetabulum is shallow, and the disproportion between the size of the head and the acetabulum is apparent.

To investigate the extent of closure of the triradiate cartilage, anteroposterior pelvic tomograms were taken (Figs 4 to 6). It was clear that the anterior portion of the triradiate cartilage was open, and the posterior half was closed by an osseous bridge. The inferior half of her right pelvis was small when compared with the normal side (Fig. 1). A CT scan showed a posterior subluxation of the femoral head.

At three years of age a surgical attempt was made to excise the osseous bridge using the iliofemoral approach. When the inner side of the pelvis and acetabulum was exposed, the hip joint was not opened; the horizontal portion of the triradiate cartilage was noted to be closed posteriorly, but open anteriorly. Using a dental drill, the osseous bridge was carefully resected, under direct vision. The cavity in the bone was next filled with autogenous fat, as described by Langenskiöld (1975). After operation progress was complicated by deep infection; drainage of the wound and parenteral antibiotics were required. Four months later, the osseous bridge recurred.

DISCUSSION

This child's history of prematurity and staphylococcal septicaemia is highly suggestive of a possible concomitant septic arthritis of the hip. There had been no known injury to the hip. Septicaemia can be difficult to recognise in premature and young infants. Infection of the hip may appear almost simultaneously with the onset of septicaemia, even though the infant is on antibiotic therapy (Obletz 1960, 1962).

It has been shown that staphylococcal pus liberates a proteolytic enzyme that digests cartilage. The action of the pus on the articular surface has been described previously (Barnhart *et al.* 1967). The triradiate cartilage placed at the junction of the ilium, ischium and pubis functions as a growth plate for these three bones. It is possible that the proteolytic enzyme liberated by the pus can reach the triradiate cartilage and totally or partially destroy it.

As the acetabular growth is impaired and the femoral growth continues, progressive subluxation is

Fig. 4

Fig. 5

Fig. 6

Anteroposterior pelvic tomograms at three different depths. The two initial cuts (at 5.0 and 6.0 centimetres) show the cartilage closed. The most superficial (at 6.5 centimetres) shows the cartilage still open.

likely. With our short follow-up we have been unable to see such progression; however, a longer follow-up may show these changes (Hallel and Salvati 1977).

Involvement of the proximal femoral growth plate

is well known. We cannot understand why damage to the triradiate cartilage is not more common. A review of the past 14 cases of septic arthritis of the hip in our institution failed to demonstrate any such case.

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