Acetabuloplasty for neglected dislocation of the hip in older children

E. Morsi
From Shibin Elkom University Hospitals, Menoufyia, Egypt

This paper describes the technique and results of an acetabuloplasty in which the false acetabulum is turned down to augment the dysplastic true acetabulum at its most defective part. This operation was performed in 17 hips (16 children), with congenital dislocation and false acetabula. The mean age at operation was 5.1 years (4 to 8). The patients were followed clinically and radiologically for a mean of 6.3 years (5 to 10). A total of 16 hips had excellent results and there was one fair result due to avascular necrosis. The centre-edge angles and the obliquity of the acetabular roof improved in all cases, from a mean of -15.9° (-19° to 3°) and 42.6° (33° to 46°) to a mean of 29.5° (20° to 34°) and 11.9° (9° to 19°), respectively. The technique is not complex and is stable without internal fixation. It provides a near-normal acetabulum that requires minimal remodelling, and allows early mobilisation.

The treatment of congenital dislocation of the hip after walking begins and dysplasia in the older child are challenging problems. In children older than four years, the bony deformity is increased and the potential for remodelling decreased. Various procedures to correct acetabular dysplasia have been described including innominate osteotomy, acetabuloplasty, shelf arthroplasty, and innominate osteotomy with medial displacement of the acetabulum. This study describes an acetabuloplasty in which the portion of ilium that forms the false acetabulum is redirected to restore the shape and size of the acetabulum.

Patients and Methods
Between January 1996 and June 2000, 17 hips in 16 children (15 girls, one boy) with neglected dislocation of the hip and a false acetabulum (Severin group V) were treated. The mean age at operation was 5.1 years (4 to 8) and the mean follow-up was for 6.3 years (5 to 10). Clinical and radiological assessment was undertaken pre-operatively and at six weeks, six months, and yearly thereafter. The Severin and Barrett-Staheli classifications were used for radiological and clinical evaluation, respectively. Radiological measurements included the centre-edge (CE) angle of Wiberg and the obliquity of the acetabular roof.

Operative technique. The child is placed supine with a small radiolucent pad beneath the buttock. Following open adductor tenotomy and using an anterior approach, the true acetabulum, along with the lateral aspect of the ilium above, is exposed. The deep transverse acetabular ligament is divided and reduction of the femoral head into the true acetabulum is attempted. If this is difficult, femoral shortening is undertaken. In the first four cases, concomitant femoral shortening was not required because of pre-operative adductor tenotomies and longitudinal traction with internal rotation for about one month. After reduction, the acetabuloplasty is carried out.

The maximum length of the false acetabulum (AB, Fig. 1) and half this length on the lateral aspect of the ilium (BC, Fig. 1) are measured. Point A is the junction between the true and false acetabula and B the junction between the false acetabulum and the ilium superiorly. From C, lines are drawn to the anterior and posterior edges of the junction of the false and true acetabula (Fig. 2). The lines are delineated by multiple drill holes (2.7 mm), and using a thin wide osteotome and holes, are connected taking care to leave 7 mm to 10 mm of bone at the junction of the false and true acetabula. Point A is the junction between the true and false acetabula.

The maximum length of the false acetabulum (AB, Fig. 1) and half this length on the lateral aspect of the ilium (BC, Fig. 1) are measured. Point A is the junction between the true and false acetabula and B the junction between the false acetabulum and the ilium superiorly. From C, lines are drawn to the anterior and posterior edges of the junction of the false and true acetabula (Fig. 2). The lines are delineated by multiple drill holes (2.7 mm), and using a thin wide osteotome and holes, are connected taking care to leave 7 mm to 10 mm of bone at the junction of the false and true acetabula in order to preserve stability and the blood supply. The false acetabulum is then levered downwards until it covers the femoral head completely. As the dislocation is usually directed anterolaterally, the false acetabulum when turned down forms the anterolateral part of the resultant acetabulum. A full-thickness graft from the anterior part of the iliac crest is...
trimed to the shape of a wedge, whose base is made a little more than half the length of the false acetabulum. The correct height is determined by noting the opening of the bony gap. This is separated by a laminar spreader and the grafts firmly impacted (Fig. 3). The false acetabulum is then stable in the correct position. After capsulorrhaphy and suture of the iliac apophysis the wound is closed.

With the hip in neutral or slight abduction and internal rotation, a one-and-a-half spica cast is applied. This is removed after six to eight weeks and the position checked radiologically.

Results

At a mean follow-up of 6.3 years (5 to 10), 16 of 17 hips had excellent results, improving from Severin group V to group I (excellent with normal hip, Fig. 4). The last hip improved to group II (good with mild deformity of the femoral head). The CE and acetabular roof angles improved in all cases from a mean of -15.9˚ (-19˚ to 3˚) and 42.6˚ (33˚ to 46˚) pre-operatively, to a mean of 29.5˚ (20˚ to 34˚) and 11.9˚ (9˚ to 19˚) post-operatively, respectively. One hip developed avascular necrosis type II, with changes in the epiphysis and lateral physis. Clinically, 16 cases were excellent with a stable painless hip, no limp, a negative Trendelenburg test and a full range of movement, and one was fair with a stable painless hip but a limp, a positive Trendelenburg test and moderate stiffness.

Discussion

The principles of treatment of a dislocated hip are to obtain and maintain reduction. In older children, the surgeon should also deal with the smaller than normal acetabulum and its deficiency at the site of dislocation. Many operations try to achieve this, but our acetabuloplasty differs from others, such as those of Dega, Krol and Palokowski, Pemberton, Tavares and Wenger in both concept and technique. The procedure depends on using the false acetabulum with its cartilage to augment the true acetabulum at its most defective part. The resultant acetabulum is nearly normal in position, size and shape and requires minimal remodelling at the junction of the true and false acetabula. Other procedures cannot produce a normal hip, but create a situation whereby growth can normalise the hip. They
reduce the curvature, but the acetabulum remains smaller and dysplastic. In our technique, the centre of rotation of the false acetabuloplasty is at the junction of the true and false acetabula, whereas in other incomplete pelvic osteotomies the fulcrum is within the true acetabulum, which reduces its curvature and may affect the normal growth potential of the cartilage. However, whereas the false acetabuloplasty is limited to hips with a false acetabulum, other acetabuloplasties can be done in cases with or without a false acetabulum. When there is no obvious demarcation between the true and false acetabula, our acetabuloplasty is contraindicated. Nevertheless, false acetabuloplasty and femoral osteotomy are complementary means of maintaining reduction. The clinical and radiological results in this preliminary work are encouraging. The main advantages of false acetabuloplasty are simplicity, stability without fixation, minimal requirements for remodelling and early postoperative mobilisation.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References

Fig. 4a Fig. 4b Fig. 4c

Radiographs of a 4-year-old girl a) pre-operatively with a neglected dislocation of the left hip and false acetabulum, b) three months post-operatively and c) six years post-operatively with a complete reduction and a near-normal acetabulum.