Trochanteric advancement for premature arrest of the femoral-head growth plate

6-year review of 30 hips

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Between 1971 and 1985, 30 children (35 hips) with premature closure of the subcapital growth plate were treated with trochanteric advancement. After 6 (3–8) years, 25 children (30 hips) were reviewed. Of the 30 hips, 27 had had one or more operations before the trochanteric advancement. All the trochanters fused without complication. Trendelenburg's sign was positive in 24 hips preoperatively and became negative postoperatively. The hip abduction was increased in 28 of the 30 hips reviewed.

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Premature closure of the subcapital growth plate of the femur results in shortening of the femoral neck and trochanteric overgrowth (Gage and Cary 1980, Gore 1974, Thomas et al. 1982). The trochanteric overgrowth results in decreased hip abduction, which is due to impingement of the trochanter on the ileum and loss of the normal length of the gluteal muscle. Lloyd-Roberts et al. (1985) described a trochanteric advancement operation for restoring the spacial relationship between the trochanter and the femoral head.

We have assessed 25 children with premature growth-plate closure 6 (3–8) years after trochanteric advancement.

Patients

Between 1971 and 1985, 30 children were operated on with trochanteric advancement. Of these, 5 were lost to follow-up. The remaining 25 children, 21 girls and 4 boys, were assessed. In 5 children the operation was performed bilaterally. The mean age at operation was 10 (6–13) years. The premature growth-plate closure was caused by congenital dislocation (23 hips), Perthes' disease (5), and septic arthritis (2). Twenty-seven hips had been operated on at least once previously: subtrochanteric derotation varus osteotomy in 24 hips, derotation valgus osteotomy in 2 hips, and open reduction in 9 hips. In 10 hips, the osteotomy and trochanteric advancement were performed simultaneously.

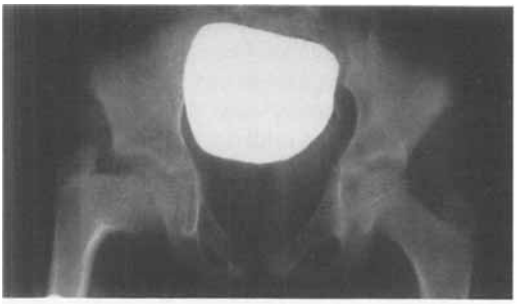
Preoperatively, passive range of motion and Trendelenburg's sign were recorded, and the articulo-trochanteric distance on frontal radiographs was measured according to Edgren (Edgren 1965, Gage and Cary 1980, Eliasson et al. 1988).

The operation

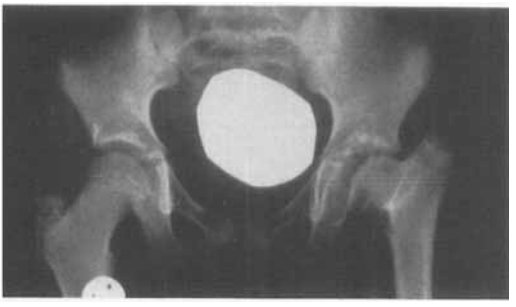
Our operation is simple, and is similar to that described by Lloyd-Roberts et al. (1985). The operation is performed with the patient supine and under general anaesthesia. A sandbag is placed under the operated on side. The incision (about 15 cm long) is lateral and longitudinal starting 5 cm above the top of the greater trochanter. The glutei medius and minimus are dissected from the joint capsule, and the soft tissues are mobilized. The trochanter is detached at its base with a Gigli saw or osteotome. The trochanter, with its attached muscles, is then freed from the capsule and soft tissues; next, it is pulled 2 to 3 cm downwards and a little outwards; finally, it is fixed with two or three screws after cortex has been removed from the new attachment site (Figures 3 and 4).

A plaster cast was used in all the cases, with the operated on hip in abduction for 6 to 8 weeks. After removal of the cast, the children receive mobilizing excercises in bed for 1 month, and then they walk on crutches for another 2 to 3 months with initial partial weight bearing.

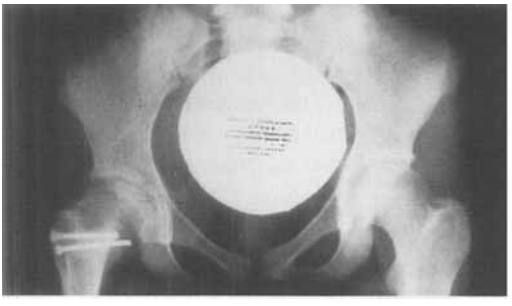
Our only complication was one superficial wound infection. All the trochanters united in their new position.



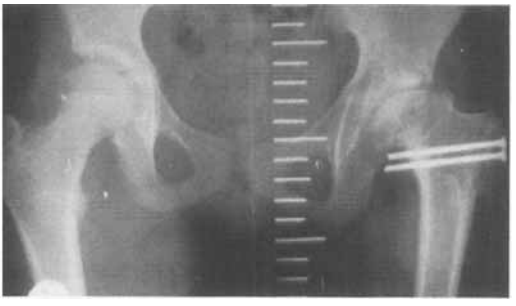
At aged 10 years, trochanteric advancement of the right hip.



At aged 8 years, trochanteric advancement because of a positive Trendelenburg sign and limited hip abduction.



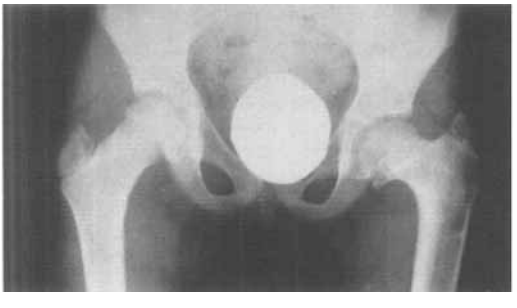
Five years postoperatively. Abduction had increased and the positive Trendelenburg sign had become negative.



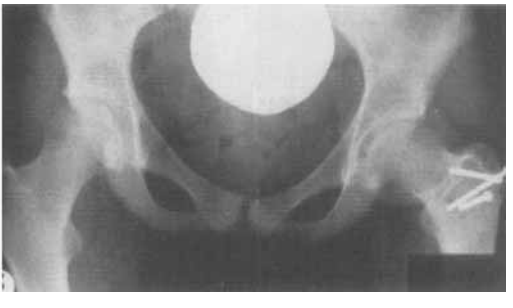
Four years postoperatively, the Trendelenburg sign became negative and the hip abduction was increased to almost full range.

Figure 1. A 15-year-old girl treated at aged 5 months for bilateral CDH with open reduction of the right hip and the left hip placed in a plaster cast. The right hip developed necrosis.

Figure 2. A 12-year-old girl treated with a splint at the age of 4 months for left CDH. The hip developed necrosis.



Trochanteric advancement was performed at aged 12 years because of a positive Trendelenburg sign.



Four years postoperatively, the Trendelenburg sign was negative, and the result of the operation was excellent.

Figure 3. Girl with Perthes' disease of the left hip. At aged 5 years, a subtrochanteric varus derotation osteotomy was performed.

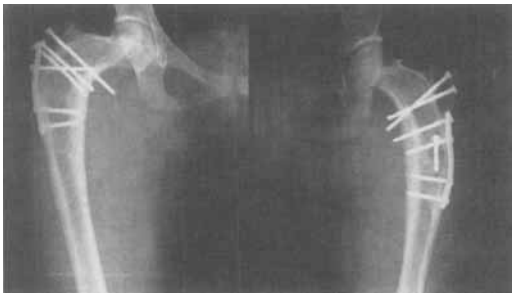


Figure 4. Girl now 18 years old. She was treated for CDH with a plaster cast at aged 6 months and developed bilateral necrosis of the femoral head. At aged 2 years, a bilateral subtrochanteric varus derotation osteotomy was performed. At aged 12 years, she underwent a repeat subtrochanteric osteotomy bilaterally with simultaneous trochanteric advancement.

She had a positive Trendelenburg sign bilaterally before the last operation and limped. Six years after the operation, the Trendelenburg sign was negative and she walked without a limp.

Results

Twenty of the 24 hips that preoperatively had a positive Trendelenburg sign were negative postoperatively.

Abduction increased 11° (10°–15°) more than it was preoperatively. In two hips, the abduction did not change. The articulo-trochanteric distance increased from 9.3 (–15 to –5) mm to 17 (25 to –3) mm.

Discussion

Necrosis of the subcapital femoral physis may cause disturbance of femoral-head development (coxa magna, loss of sphericity, acetabular dysplasia, and subluxation), as well as disturbance of femoral-neck development (shortening and coxa vara). These changes result in limping, a positive Trendelenburg sign, and a limited range of motion (mainly abduction).

Trochanteric distal displacement increases the gluteal tension and abolishes the impingement that limits abduction (Lloyd-Roberts et al. 1985). The operation is technically easy; the trochanter fused without complication in all our 30 hips.

Physiodesis of the greater trochanter has been suggested as an alternative to trochanteric advancement by Langenskiöld and Salenius (1967) and by Gage and Cary (1980). This operation, however must be performed when the child is between 6 and 8 years of age. At aged 8 years, trochanteric growth is reduced 50 percent, with all subsequent growth occurring at the top of the trochanter.

Our study shows that trochanteric advancement is a worthwhile operation in children with symptomatic shortening of the femoral neck. The operation is usually performed after 8 years of age when physiodesis of the greater trochanter is no longer useful.

References

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