

Correction of Persistent Bilateral Femoral Anteversion

A Comparison of Two Different Surgical Procedures: A Case Report

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Persistent femoral anteversion, though of very low incidence, will be seen sporadically in practice. The condition must be considered when faced with a patient with intoeing gait. In a normal child, physiologic femoral anteversion should remodel itself by the age of 8-10 years. Surgical correction is only considered when there is limitation of daily activities. There are various acceptable procedures to correct anteversion. This case report details a 6 year old female with persistent bilateral femoral anteversion corrected using two different procedures: a subtrochanteric osteotomy fixed with k-wires on one side, and a diaphyseal osteotomy fixed with plate and screws on the other side. Each produced a different result. Although the cross pin fixation of the osteotomy seemed to be adequate, there was loss of reduction in that side during the post operative period. A better result was noted on the side fixed with plate and screws. However, follow up radiographs showed well remodelled osteotomies bilaterally. Sequential follow up for two years post surgery revealed an excellent outcome in terms of gait and function.

Keywords: Persistent femoral anteversion, Derotation osteotomy, intoeing

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Femoral anteversion may occur due to internal rotation of the limb bud during early intrauterine life, which gradually lessens during the post natal period⁽¹⁾. As the child grows, the anteversion decreases about 1.5 degrees each year until age fifteen⁽²⁾. Habitual sitting and sleeping postures also play a major role in the remodelling of anteversion⁽³⁾. The normal femoral anteversion angle varies approximately 15 degrees, and is usually greater in females. Surgical correction of excessive anteversion is required when there is limitation of daily activities⁽⁴⁾.

Femoral neck anteversion is defined as the angle between an imaginary transverse line that runs medio-laterally through the knee joint, and an imaginary transverse line passing through the centre of the femoral head and neck⁽⁵⁾. Various methods exist to measure the anteversion angle, and hence the angle needed to correct the deformity. Derotation osteotomy can be performed at various levels as indicated, each with its own advantages and disadvantages. The ultimate goal is to bring about a normal gait, and an early return to full activity.

Case report

A 6 year old female born to non consanguineous parents, was first recognized to have intoeing gait and abnormal postures on standing, sitting or lying at the age of one. There was no history of birth-related trauma, or predisposing illness that might have caused these problems. There was no family history of femoral anteversion. All developmental milestones were normal. The child remained active, but had great difficulty in squatting, running and playing. She managed to do all other activities normally.



Fig. 1 Sitting in the "W" or the reverse tailors position

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On physical examination, the child stood and walked with toes pointing inwards. The medial rotation was obvious when the child was asked to run. The child sat comfortably in the “W” or the reverse tailors position, but sitting cross-legged was not possible (Fig. 1). Internal rotation of both the hips was found to be 90 degrees and external rotation was restricted. All other movements of the hip were normal.

Other causes of intoeing such as internal tibial torsion and metatarsus adductus were excluded. Further evaluation of the patients hips included anteroposterior and lateral radiographs, as well as an anteroposterior view of the knee. These revealed excessive femoral anteversion bilaterally. Using the radiographs, the angle of anteversion was measured by Magilligan’s method, and found to be approximately 42 degrees in both limbs⁽⁶⁾.

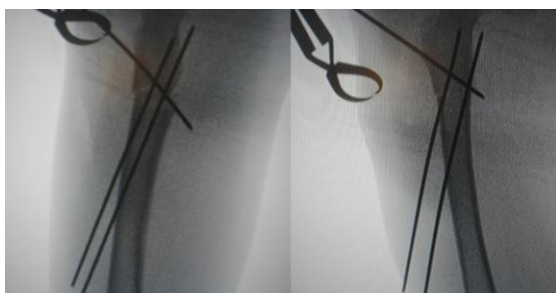


Fig. 2 Intra operative picture of osteotomy site fixed with k-wires.



Fig. 3 Radiograph showing union and the varus collapse of the left femur.

Surgical correction was planned in two steps: first the left side and later the right. The treatment procedures were clearly explained to the parents and informed consent was obtained. Initially a derotation osteotomy on the left limb at the subtrochanteric level was fixed with three

Kirschner wires (Fig. 2). Two weeks post surgery varus collapse occurred. Since good radiological evidence of callus formation was seen at this osteotomy site, no attempt was made to correct it. The limb was immobilized in a single hip spica and the osteotomy site healed uneventfully. Six weeks after the first surgery a right diaphyseal derotation osteotomy was performed, and fixed using a plate and screws. This operation had a comparatively better outcome (Fig. 3).

At six weeks post surgery, there was adequate callus at both osteotomy sites and normal internal and external rotation had been regained. The patient had 0.5 cm shortening on the left side compared to the right, caused by the varus collapse. She was started on range of motion exercises at four weeks and all movements were gradually regained. Weight bearing was allowed as tolerated after 12 weeks. The child was able to sit cross legged by four months (Fig. 4) and was able return to school.



Fig. 4 Sitting comfortably in a cross legged position four months post surgery

Discussion

Persistent femoral anteversion limiting daily living activities affects the psychological development of the child. The abnormal gait is obvious and worries the parents most. The functional disability is the inability to sit crosslegged. The objectives of surgical correction are: 1) to bring about a normal gait, and 2) to restore normal participation in all activities. The degree of anteversion is related to osteoarthritis in early adulthood⁽⁷⁻⁹⁾. Huber (2009) said that the reduced femoral antetorsion should be regarded as a third cause of femoral acetabular impingement⁽¹⁰⁾. Adequate correction of anteversion must be achieved by first completing a detailed preoperative study. Measurement of the degree of anteversion plays a major role and is most often obtained using radiographs⁽¹¹⁾. Use of ultrasonography and computerised tomography also yield accurate measurements⁽¹²⁾.

Various techniques for surgical correction of persistent femoral anteversion are available. We chose the classic subtrochanteric derotation osteotomy, fixed with Kirschner wires one side in our patient⁽¹³⁾. Varus collapse occurred at this osteotomy site during the early post operative period, and was managed with a single hip spica. The desired rotation could be maintained, but a 0.5cm shortening resulted in that limb. The forces acting on the osteotomy site exceeded the resistance offered by the k-wires which led to the varus collapse. Considering the early radiological callus formation and excellent remodelling capacity of the young bone, we did not intervene to correct the loss of leg length caused by the k-wire fixation.

To avoid a similar risk, the right side received a diaphyseal derotation osteotomy fixed with a plate and screws to increase the stability of fixation. Both osteotomy sites healed well in the normal course of time. Sequential follow up revealed symptomatic improvement, and the ultimate goal of correcting the intoeing and returning the child to normal activity was achieved. Two year follow up showed no complications apart from the initial varus collapse on the left. The shortening of 0.5 cm on this side is presently well tolerated. However, we cannot predict the final shortening when skeletal maturity is reached. The parents were instructed to follow up every six months. At present the child is now able to take part in all daily activities, including sports. Various studies document the need for correction of excessive femoral anteversion in order to bring about an improved lifestyle for the patient^(14,15).

The proposed study was reviewed by the ethics committee, and has been performed in accordance with the ethical standards laid down in an appropriate version of the 1964 Declaration of Helsinki.

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