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Case Report

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Morscher's osteotomy in posttraumatic sequale of hip in adolescent using dynamic hip screw: case report

Gaurav Garg*, Ratan Dayma, Rakesh Meena

Department of Orthopaedics, S. M. S Medical College and Hospital, Jaipur, Rajasthan, India

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***Correspondence:**
Dr. Gaurav Garg,
E-mail: gaurav_ortho@yahoo.com

ABSTRACT

Premature closure of proximal femoral epiphyseal plate can be a complication of hip dysplasia, Perthe's disease, trauma or septic arthritis of hip. It may eventually result in Coxavara and shortening of femoral neck and upward migration of greater trochanter. Morscher's osteotomy is an intertrochanteric osteotomy that can create valgusization with lengthening of femoral neck, correction of high riding greater trochanter and compensates for short limb length as a single stage procedure. The purpose of this case report is to evaluate early results of Morscher's osteotomy fixed using paediatric dynamic hip screw in adolescence.

Keywords: Morscher's osteotomy, Paediatric dynamic hip screw, Proximal femoral osteotomies

INTRODUCTION

Optimal femoral length and adequate neck shaft angle is essential to lever the femoral head around the pelvis effectively, contributing to normal gait pattern.[1] Premature closure of proximal femoral epiphyseal plate can be a complication of hip dysplasia, Perthe's disease, trauma or septic arthritis of hip. It may eventually result in Coxavara and shortening of femoral neck and upward migration of greater trochanter. This typical deformity reduces tension in pelvic-trochanteric muscles and shortens the abductor lever arm, leading to positive Trendelenburg's sign and leg length discrepancy.[2] The associated upward migration of greater trochanter results in trochanteric impingement and restricted hip abduction. Pain in hip and limping are often the associated features.

Proximal femoral osteotomies play an important role in the treatment of numerous hip disorders in children.[3] Modern imaging has confirmed the arthrogenic role of morphological femoral head or head/neck disturbances, and thus better understanding of these pathological entities has renewed interest in salvage procedures to preserve the hip. The femoral neck lengthening osteotomy aimed at restoring the normal hip biomechanics by restitution of length of the femoral neck and limb length inequality, and improving the lever arm of the abductor mechanism. The conventional valgus intertrochanteric osteotomy for coxavara cannot address the associated problems of high riding greater trochanter and short femoral neck. Author's performed Morscher's osteotomy, which can address all the problems associated with coxavara. It is intertrochanteric osteotomies that can create valgusization with lengthening of femoral neck, correction of high riding greater trochanter and compensates for short limb length. The purpose of this case report is to evaluate early results of Morscher's osteotomy in adolescence.

CASE REPORT

A 16 years old male referred to us with chief complaints of pain in right hip and limping. Patient had a history of fall from height (around 10 feet), 10 years back injuring his right hip. He was able to stand and walk on its own following the episode, but had moderate pain in the hip.

He was treated conservatively by pain medication and massage at that time. No radiographs were taken following the injury. Pain gradually improved over a period of time and patient was asymptomatic 1.5 months following injury. After 2 years, during a routine health checkup in school, parents were told about slight limp in child and were asked to consult at higher center for evaluation. But due to poor financial condition of the family, child got neglected for almost 8 years. Limp gradually progresses over a period of time and now since last 5 months, patient started complaining of pain in right hip which forced him for treatment. Pain was mild in intensity to start with, which gradually progresses to moderate intensity limiting his activities of daily living. Pain was relieved with rest and medication. He was not able to squat and sit cross legged. There was no history of any long standing illness in the past, eliminating the possibility of infective pathology.

Patient had a typical short limb gait with shortening of around 3.5 cms in right lower limb. Abduction of right hip was markedly restricted to 20 degrees compared to normal side of 45 degrees due to mechanical block and pain. Also flexion was terminally restricted in affected hip.Hip abductor and flexion strength was 3/5 (MRC Scale). Antero-posterior radiographs of pelvis with both hips and lateral of the affected hip was taken which shows coxavara (neck shaft angle 110 degrees), trochanteric overgrowth and markedly shortened femoral neck as presented in Figure 1. Greater trochanter was almost abutting the superior wall of the acetabulum. CT scan shows deficient anterior coverage of the femoral head but the orientation of femoral head in the acetabulum was good as given in Figure 2. Morscher's osteotomy was performed to cater problems of short neck, greater trochanter up riding and limb length discrepancy in single stage. Written consent was taken for treatment and submission of data for research purpose.

Figure 1: Antero-posterior radiographs of pelvis with both hips showing coxavara, greater trochanteric overgrowth and markedly shortened femoral neck on the right side.

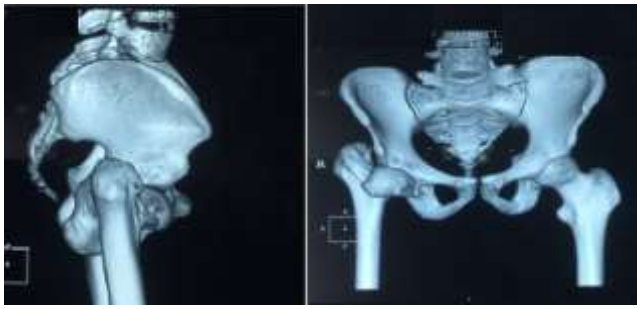

Figure 2: 3D CT scan image of the patient showing deficient anterior coverage of the femoral head but the orientation of femoral head in the acetabulum looks good.

Surgery was executed in supine position on fracture table under fluoroscopy control. Pre-operative planning of osteotomy was done on plain paper to avoid surprises during the surgery. For fixation of osteotomy authors have used 135º paediatric dynamic hip screws (DHS). A 10 cm longitudinal skin incision is made downwards starting from the tip of greater trochanter along the femoral shaft. The gluteal fascia and fascia lata are divided to expose gluteal muscles, greater trochanter and the vastuslateralis muscle. The latter is then detached from the greater trochanter by an L-shaped incision. Three K-wires guides were inserted: the first K-wire marking the line of osteotomy at the level just above the lesser trochanter and parallel to femoral neck making an angle of 135º using angle guide, second K-wire was inserted along the upper border of femoral parallel to first wire, third wire was above the second wire for partial resection of hypertrophied greater trochanter as seen in Figure 3. Proximal two osteotomies were done along the guided wires. Partial resected fragment of greater trochanter was placed lateral to femoral neck fragment. Greater trochanter was lowered and placed lateral to femoral neck, which was facilitated by abduction of limb and fixed with two 4.5 mm cannulated cancellous screws. Lag screw was inserted between the first and second wire at an angle of 135º. Distal oblique osteotomy was then performed and 4-hole DHS plate was placed which pulls the femoral shaft distally and laterally. Wound was closed in layers over suction drain.

Figure 3: Intra-operative image showing placement of guide wires for osteotomy.

Post-operative X-ray shows reasonable regaining of neck length, distal transfer of greater trochanter and normalization of neck shaft angle as shown in Figure 4. Patient was allowed sitting in bed as tolerated after 2 days. Active ankle pumps and isometric quadriceps exercises were started. Post-operative shortening was 1.5 cms compared to pre-operative limb length discrepancy of 3.5 cms as seen in Figure 5. After period of immobilization patient was allowed up on crutches after 6 weeks progressing to full weight bearing, when X-rays demonstrate consolidation at osteotomy sites. Abduction strengthening exercises were started after 4 months when greater trochanter shows union. At 1 year follow up, patient was satisfied with the surgery, walking normally with slight limp. He uses shoe raise for compensation of 1.5 cms shortening. He is able to squat and sit cross legged. Active hip abduction improved to 40º, with flexion still terminally restricted. Trendelenburg's sign was still positive. X-ray at 1 year follow up shows good union at the osteotomy sites with implants well in place and no evidence of avascular necrosis of femoral head as given in Figure 6.

Figure 4: Post-operative radiograph showing regaining of neck length, distal transfer of greater trochanter, normalization of neck shaft angle and fixation with paediatric dynamic hip screw.

Figure 5: Clinical photograph showing pre-operative shortening of 3.5 cms (A) compared to post-operative limb length discrepancy of 3.5 cms (B).

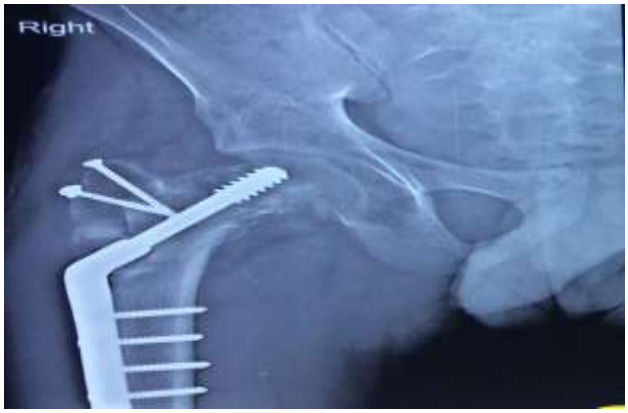

Figure 6: Radiograph at 1 year follow up shows good union at the osteotomy sites with implants well in place and no evidence of avascular necrosis of femoral head.

DISCUSSION

Complex proximal femoral osteotomies play an important role in the treatment of numerous conditions associated with adolescent hip.[3] Indications for these procedures have extended beyond dislocations or subluxations in children with neurological hip diseases. Even in asymptomatic patients there may be an indication for surgery, because development of arthrosis and hip subluxation are not well acceptable.[4] Progression and severity of hip deformities are linked to remaining growth potential. Abnormal biomechanical forces will gradually cause joint incongruence, which eventually leads to osteoarthritis of the hip in young adults.[5] These femoral osteotomies help normalizing the biomechanics, which may halt the progression to advance disease. The presence of advanced arthritis and stiffness may be a contraindication to joint preservation surgery.

Morscher's osteotomy could simultaneously address problems associated with extra-articular proximal femoral deformities that involve coxavara, overgrowth of greater trochanter, lesser trochanter too medial, shortened femoral neck and limb length discrepancy. Orientation of trochanters in proximal femur is important biomechanically as they serve as the insertion points for critical muscle groups. If the distance of these muscle insertions to the center of femoral head is altered, lever arm dysfunction ensues manifested as muscle weakness and fatigue.[6] Case presented here had proximal and medial migration of greater trochanter, causing reduced muscle tension and lever arm, manifesting as limp and muscle fatigue during walking. So, it is mandatory to test hip abductor and flexion strength before embarking on surgery.Other approaches for correction of proximal femoral anatomy and trochanteric overgrowth have been described. Wagner has given valgus intertrochanteric/ subtrochanteric osteotomy combined with lateral-distal transfer of greater trochanteric osteotomy, but it is reserved for cases where joint congruity is disturbed and femoral head is not spherical.[7] Ganz relative neck

lengthening osteotomy, best addresses the extra-articular impingement from greater trochanter and has less chance of hampering the vascularity of femoral head but it does not lengthen the limb.[8] So, it's important to choose the correct procedure, which deals with all the problems in single stage.

Morscher's osteotomy is reserved for children above 8 years of age with Trendelenburg sign and limited abductionhowever, it does not change the orientation of the femoral head in the acetabulum and therefore the congruity of the hip joint stays the same.[6,9]

The present technique of osteotomy was described by Morscher, as a double osteotomy which consists of two parallel oblique osteotomies, along the upper and lower border of femoral neck, making an angle to the femoral shaft corresponding to the desired neck-shaft angle.[10] Later, Hasler and Morscher showed good results in 32 out of 37 patients treated by this technique with a mean follow-up of eight years.[11] Lengsfeldet al showed satisfactorily results in their long term follow-up study on valgus and neck lengthening osteotomy.[12] Authors believe that haematoma formed at osteotomy site serves as source of signaling molecules and the medial compression force due to pull of iliopsoas facilitates union. Proximal femoral osteotomy could be stabilized with internal or external fixation. Blade plate fixation is one of the described methods, but we used dynamic hip screw which gives excellent control and correction in sagittal and coronal plane. Also, the distal most osteotomy is done parallel to DHS lag screw which helps achieving the desired neck-shaft angle and guides for adequate distalization of the shaft. Only possible disadvantage with this osteotomy is difficulty in future total hip replacement although some reports disagrees with it.[13] This case report helps us to conclude that Morscher's osteotomy and fixation with easily available dynamic hip screw is a simple and reasonable option for treatment of conditions of hip associated with coxavara, short femoral neck, upward migration of greater trochanter and limb length discrepancy.

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