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Original article

The role of trochanteric flip osteotomy in fixation of certain acetabular fractures

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ABSTRACT

Purpose: Complete visualization of certain acetabular fractures of posterior wall or column with cranial extension involving superior dome from standard surgical exposures is a challenge. Osteotomy of the greater trochanter has been used to enhance fracture visualization, especially the dome, in posterior and lateral exposures of the acetabulum. It also decreases the need for excessive muscle retraction. The purpose of the study was to investigate the outcome associated with trochanteric flip osteotomy in the management of certain acetabulum fractures.

Methods: From January 2011 to December 2013, 25 displaced acetabular fractures were treated by open reduction and internal fixation. The fractures were managed using a Kocher–Langenbeck approach along with trochanteric flip osteotomy. At 3rd, 6th and 24th month follow-up, all patients had radiographic examination and underwent a final clinical evaluation based on the modified Merle d'Aubigne and Postel score. The strength of the abductors was assessed according to the Medical Research Council (MRC) grading system.

Results: Congruent reduction was achieved in all patients and all osteotomies healed within an average period of 3.8 months. All our patients were allowed full weight bearing at the end of 3 months and with no abductor lurch at the end of 6 months follow-up. There were no cases of avascular necrosis of femoral head. None of the patients had any neurovascular complication or infection by the end of the follow-up period.

Conclusion: Trochanteric flip osteotomy is a very effective technique to fix certain acetabular fractures especially those with dome involvement. It is more accurate and associated with no significant complications compared with conventional way.

Introduction

The Kocher–Langenbeck approach provides adequate surgical exposure and is recommended in the majority of posterior acetabular injuries and some selected fractures involving both columns. However, in certain posterior wall fractures with significant superior dome involvement, especially in obese patients, visualization of the superior portion of the acetabulum provided by this classical approach is insufficient. In order to visualize such fractures, excessive retraction can damage the abductor muscles and neurovascular structures (superior gluteal neurovascular bundle). In this condition, trochanteric osteotomy can be used to extend the exposure of the Kocher–Langenbeck approach superiorly and anteriorly. In addition, certain transverse, transverse plus posterior wall, T-type and associated posterior column plus posterior wall fracture patterns may be treated using this approach.[1] However, the fear of possible complications like non-union of the osteotomy site, abductor weakness as well as extra implants for fixation, constrains the surgeons to avoid using this procedure.[2,3] To overcome these problems, trochanteric flip osteotomy is a modified technique which has been described and recommended by many authors.[4,5] In contrast to standard procedure, in the trochanteric flip approach, the tendinous attachments of the gluteus muscles are left intact proximally and the tendinous origin of the vastus lateralis is left intact distally, which provides a neutralizing force to that of the gluteal muscles and thereby reduces the tendency of the trochanter to migrate proximally.[1,4] This study aims to report our

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experience with this technique for the management of acetabular fractures.

Materials and methods

This is a retrospective study of prospectively collected data from January 2011 to December 2013. The study was done at the first author's institute. The inclusion criteria was any patient with (1) posterior fracture dislocation of hip with significant posterosuperior wall fractures, (2) posterior column acetabular fractures or combined posterior column and wall fractures and (3) transverse fractures with posterior wall fractures.

We kept a low threshold for performing this digastric osteotomy in posterior and transverse acetabulum fractures with dome or cranial extension, with posterosuperior comminution in which we felt that direct visualization of the fracture lines would be better served.

The patients included in study were those who received operation from January 2011 to December 2013. Out of the 63 total operated acetabular fractures, 25 patients were operated on using this approach. Complete examination of all the patients with such fractures was done both clinically and radiologically including Judet views (Figs. 1 and 2) and CT scan (Fig. 3) after preliminary stabilization of patient and reduction of hip. All surgeries were performed by the single senior author.

Under suitable anesthesia, patient was placed in lateral decubitus position and Kocher–Langenbeck approach was used. In this approach fascia is incised in line with skin incision in the distal part of the incision while gluteus maximus is split in the proximal part. The trochanteric bursa was incised and reflected to expose the surface of the greater trochanter. The leg was internally rotated to view the posterior border of gluteus medius and postero-superior edge of the greater trochanter. The osteotomy site was marked with the cautery, starting proximally from the posterosuperior edge of the greater trochanter to the posterior border of the vastus lateralis ridge distally. Then, with a thin oscillating saw, osteotomy is done, with its plane in line with the direction of external rotators (Fig. 4).

The most important point to keep in mind is that the proximal part of osteotomy should start just anterior approximately 5 mm to the most posterior portion of the gluteus medius muscle. This helps to prevent the injury to the branch of medial circumflex femoral artery (MCFA). The saw should stop at the anterior cortex and the osteotome was then used to complete the osteotomy. With this, the anterior cortex was fractured, which helps in reduction while reattaching the trochanter. This osteotomy produces a trochanteric fragment of about 15 mm in thickness. After releasing the remaining fibers of gluteus medius from the trochanter proximally and vastus lateralis fibers from the femur distally, the fragment was then flipped anteriorly with the help of a retractor (Fig. 4). This fragment has gluteus medius attached proximally and vastus lateralis distally. After retraction, the piriformis tendon and gluteus minimus interval was identified and release of piriformis tendon along with superior, inferior gemelli and obturator internus around 1 cm away from their insertion was done. The reflection of short external rotators protects the sciatic nerve during retraction. Intraarticular visualization may be improved by anteriorly based Z-shaped capsulotomty. When a posterior wall fracture is present, the capsular pedicle to the wall fragments must be preserved. The capsulotomy was modified to incorporate the posterior wall at its margin. The wall fragments were then reflected inferiorly to assist in joint visualization. The labrum is typically intact at the anterior aspect of the wall fragment, but is avulsed at the posterior margin. Gluteus minimus is invariably badly damaged in such fractures and needs to be thoroughly debrided to prevent heterotopic ossification. Fracture was reduced by making use of reduction devices such as ball spikes, reduction clamps and provisionally reduction was held by kirschner wires (k-wires). Partially threaded cannulated screws were also used besides holding the final reduction with 3.5 mm reconstruction plates. In fractures involving both posterior column and wall fractures, the column was fixed first, followed by fixation of the wall. The osteotomy of the greater trochanter was then reattached with two or three 3.5 mm cortical screws or 4 mm cancellous screws directed towards the lesser trochanter (Fig. 5). Reduction of the osteotomy the trochanter usually glided back from the retracted position to its original position quite easily with finger manipulation itself and was provisionally held with a 2 mm K-wire before fixing definitively with screws. No drains were used. On the first postoperative day, patients were allowed for sitting, side turning and pelvic lifting exercises. Toe touch weight bearing was allowed in all patients within first week if possible. Deep vein thrombosis prophylaxis involved aspirin till stitch removal and rivaroxaban for further 4 weeks. Suture removal was done on twelfth postoperative day. Follow-up of the patients was done at 6 weeks, 3 months, 6 months, 1 year and thereafter 6 monthly for 2 years.

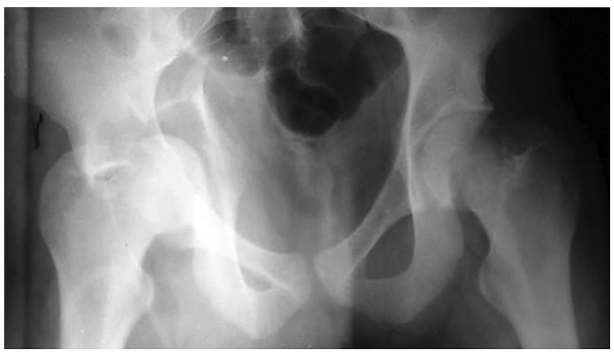

Fig. 1. Radiograph (AP view of the pelvis) showing a posterior column with posterior wall acetabular fracture on the right side.

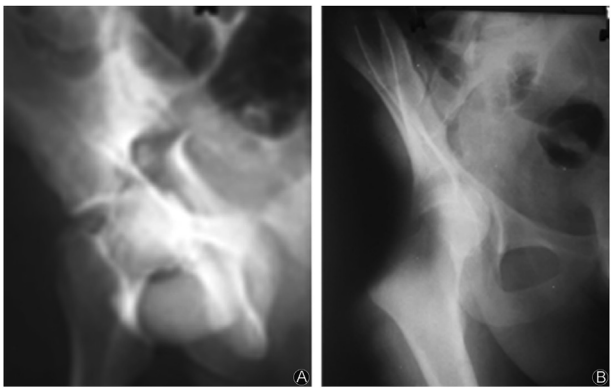

Fig. 2. Judet views of the acetabular fracture. A: Iliac view. B: Obturator view.

Results

From January 2011 to December 2013, 25 displaced acetabular fractures were treated by open reduction and internal fixation using this approach. The fractures were managed using a Kocher–Langenbeck approach along with trochanteric flip osteotomy. The mean age of the patients was 33.28 years (range 17–63 years) with a mean follow-up of 11.3 months (range 6–15 months).

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