

Kocher-Langenbeck Approach in Prone Position

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Abstract

Background: The posterior approach for acetabular fractures is the Kocher-Langenbeck (K-L) approach which is performed in lateral and prone positions. Lateral position is a familiar position for most orthopedic surgeons. Prone position yields multiple advantages compared to lateral position.

Methods: Between years 2015 and 2018, 18 patients with selected acetabular fractures in which the best decision was surgical fixation using K-L approach were studied. The surgical procedure was done using K-L approach with the patient in prone position and we used Matta scoring system to evaluate post-operative reduction quality.

Results: According to the Matta system, the anatomic reduction was observed in 13 patients (86.6%). Imperfect reduction was observed in 2 patients (13.3%), no patient had poor reduction. Avascular necrosis (AVN) of the femoral head was seen in one patient (6.6%) and no infectio and heterotopic ossification (HO) were noted.

Conclusion: The advantage of this approach in prone position is believed to be better exposure and greater access to the quadrilateral plate (QLP) and anterior column indirectly. One of the most important advantages is that in prone position, handling the reduction devices to indirectly reduce anterior column or QLP is much easier.

Keywords: Kocher-Langenbeck; Prone Position; Fracture Fixation, Internal

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Background

Since the 1980s, open reduction and internal fixation of displaced acetabular fractures have been accepted (1, 2). According to the side of fracture or its comminution, different surgical approaches could be utilized (3). Anterior-based approaches (iliac fossa, iliofemoral, ilioinguinal, Stoppa, ...) are applied for anterior acetabular fracture and posterior ones are utilized for posterior acetabular fractures (3).

In more complex fractures or in fracture treated with more than 2 to 3 weeks delay in operation, double approach or extensile approaches such as extended iliofemoral approach are chosen (4). The posterior approach for acetabular fractures is the Kocher-Langenbeck (K-L) approach that is performed in both lateral and prone positions (3).

Several hip procedures (i.e., in total hip arthroplasty via posterior approach or arthrotomy for septic arthritis) can be perfectly done via posterior approach in lateral position (5). Whereas, for the posterior acetabular fracture (posterior column fracture, posterior column and posterior wall fracture, transverse fracture, T fracture, transverse posterior wall fracture), prone position yields multiple advantages compared to lateral position (6).

In prone position, one can check for better reduction of anterior column and quadrilateral plate (QLP) using greater sciatic notch (6).

In the current study, we aimed to report our experience on performing acetabular fixation using a K-L approach via a prone position on the conventional

radiolucent orthopedic table.

Methods

After anesthetizing the patient, he/she was placed in prone position. Before draping the patient, different fluoroscopic views that would be required intraoperatively and their accessibility were checked. Marking bony landmarks, posterior superior iliac spine (PSIS), greater trochanter (GT), and femoral shaft was done. After drawing a curvilinear line with a marker from a point 6 cm distal and lateral from PSIS down to GT and continuing it in the line of the femoral shaft for 10-15 cm long from GT top, the skin and subcutaneous tissue according to the above-mentioned mark were incised; then, subcutaneous fat was elevated from fascia lata 1 cm from each side for better later closure. The rest of the K-L approach was done in a standard fashion paying special attention to neurovascular structures especially the sciatic nerve and medial femoral circumflex artery (MFCA) to prevent iatrogenic damages.

In order to evaluate post-operative reduction gap, we performed computed tomography (CT) scan and used Matta Pelvic Systems (MPS). Matta is a scoring system in which the quality of reduction after pelvic fractures are evaluated and recorded, and the scoring is categorized into three groups: in "perfect anatomic reduction" category, the fracture gap after the reduction is 1 mm or less, in the "imperfect reduction" category, the gap is 2-3 mm, and in the "poor reduction", the gap is more than 3 mm (4).

Results

Between 2015 and 2019, 18 patients with posterior-based acetabular fractures were admitted to our orthopedic center in Sina Hospital, Iran. Isolated posterior wall fractures were diagnosed in 6 patients, 4 patients had posterior column and posterior wall fractures. Transverse fracture was found in 4 patients, and 1 out of 18 patients was presented with a transverse posterior wall fracture. The K-L approach via prone position on the conventional radiolucent orthopedic table was done in all of these patients.

According to the Matta system, the anatomic reduction was observed in 13 patients (86.6%). Imperfect reduction was observed in 2 patients (13.3%), no patient had poor reduction. Avascular necrosis (AVN) of the femoral head occurred in one patient (6.6%) and no infection or heterotopic ossification (HO) was noted.

Discussion

The K-L approach is the approach of choice for open reduction and internal fixation of posterior acetabular fractures (3). Deep dissection has no major difference in both prone and lateral positions, considering some minor points besides spatial considerations that will occur by 90 degrees rotating the patient compared to lateral position.

In a study by Tannast et al., among 816 acetabular fractures, the K-L approach via prone position was used for 352 patients. They reported 82% anatomic reduction, 15% imperfect reduction (2-3-mm step), and 3% poor reduction. 80% of their hips survived for 20 years (7).

Negrin et al. in a comparative study between lateral and prone positions for posterior approach mentioned that prone position was used mostly in complicated fracture types and overall, there was no advantage with these two positions (6).

There are challenges with the K-L approach, especially in prone position. Firstly, the importance of sciatic nerve protection cannot be overlooked; in order to do this, one should avoid excessive traction and should keep hip extended and knee flexed throughout the procedure. Secondly, when cutting piriformis and triceps coxae tendons, consider femoral head vascularity; one of the main predictors of the proximity of MFCA is the trochanteric branch of this artery which can easily be found on the GT following incising the fascia. Thirdly, use sciatic nerve retractors; because of better availability of greater splanchnic nerve (GSN) in the prone position, it could be tempting to apply more traction on surrounding soft tissue in order to improve exposure. Without especially curved retractors in lesser splanchnic nerves (LSN), it could be harmful to the sciatic nerve. Fourthly, inserting anterior column lag screw from prone position could be quite problematic. The surgeon should pay attention to checking screw direction using multiple

fluoroscopic views (8).

Conclusion

The advantages of this approach in prone position, especially better exposure and greater access to the QLP and anterior column indirectly, is proven. In addition, passage of instruments that are beneficial for indirect reduction of anterior column can be placed more easily than the lateral position. Despite some challenges regarding changing spatial orientation, we believe that the K-L approach has accepted clinical significance. However, further study is required to determine the short and long-term effects.

Conflict of Interest

The authors declare no conflict of interest in this study.

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