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Single-Position Prone Fixation for Posterior Acetabular Fractures with Associated Injuries: A Case Series

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Abstract: ***Background**: The Kocher-Langenbeck approach is commonly used for posterior acetabular fractures and may be performed in either lateral or prone positioning. Consensus regarding optimal positioning remains limited. **Objective**: To describe clinical scenarios in which prone positioning facilitated posterior acetabular fracture fixation and management of associated injuries. **Methods**: We present a six-patient case series involving posterior acetabular fractures managed in the prone position using the Kocher-Langenbeck approach, with selected cases involving simultaneous fixation of associated injuries. **Results**: Fracture patterns included posterior wall, posterior column, transverse, and T-type injuries. Associated injuries included humeral fractures, tibial plateau fracture, ankle fracture, and pelvic ring injuries. Adequate fixation was achieved in all reported cases without immediate infection or sciatic nerve palsy. **Conclusion**: Prone positioning may be a practical option in selected posterior acetabular fractures, particularly when facilitating single-position management of associated injuries.***

Keywords: prone position, acetabulum fracture, posterior column fracture, posterior wall fracture

1. Introduction

Acetabular fractures, which are caused by high-energy trauma like falls from height and motor vehicle accidents, result in severe and devastating injuries [1]. The gold standard for managing displaced acetabular fractures, particularly those affecting the weight-bearing region, is open reduction and internal fixation (ORIF). However, as there is no single approach to provide adequate exposure to both acetabular columns and pelvic interiors, the surgical approach depends on the fracture pattern that is classified according to Judet Letournel's classification [2]. For fractures involving posterior acetabulum, Kocher-Langenbeck (K-L) approach is the workhorse approach as it provides direct exposure to the acetabulum, facilitates adequate reduction, and allows access for treatment of associated hip injuries [3]. The K-L approach is well described in the literature and can be done either in lateral or prone positions. But there is no consensus on patient position suitability. Traditionally, most hip surgeons opt for lateral position as it is most familiar to use when using posterior approach for hip replacement surgery [4].

This case series aims to describe the feasibility and practical indications for prone positioning during posterior acetabular fracture fixation, particularly in patients requiring management of associated injuries.

2. Methodology

This was a retrospective descriptive multicentre case series involving patients treated by a single orthopaedic trauma surgeon across tertiary referral centres in Malaysia between 2023 and 2025. This study aimed to describe perioperative clinical scenarios in which prone positioning facilitated fixation of posterior acetabular fractures and associated injuries without the need for intraoperative repositioning. All consecutive patients with posterior acetabular fractures managed using the prone-position K-L approach during the study period were included. Patients with acetabular fractures managed using alternative positioning techniques or those with incomplete clinical records were excluded.

Patient demographics, fracture patterns, associated injuries, operative positioning strategies, simultaneous procedures and fixation techniques were reviewed retrospectively from medical records and radiographic imaging. Fracture patterns were classified according to Judet-Letournel classification system.

Postoperative radiographs were reviewed to confirm adequacy of reduction and implant position. Immediate perioperative complications including infection, sciatic nerve palsy, and fixation-related complications were reviewed from available postoperative records. Ethical exemption was granted due to the retrospective descriptive nature of the study. Written informed consent for publication of clinical data and images was obtained from patients where applicable.

3. Case Presentation

3.1 Case 1

This is a case of a 51-year-old gentleman who had sustained a closed posterior column + posterior wall fracture of the right acetabulum after being involved in a motor vehicle accident. He had also sustained a closed midshaft fracture of the left humerus. Both bones were fixed with plates in the prone position (Fig. 1).

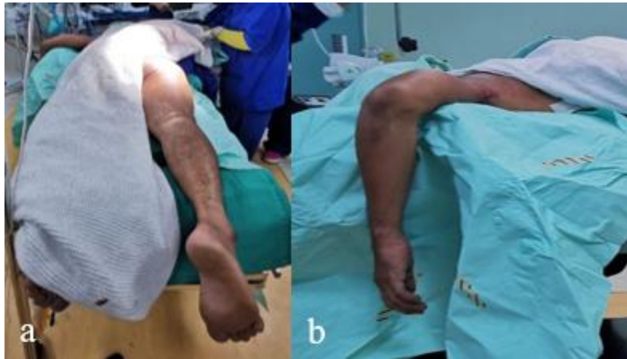

Figure 1: a) Prone positioning setup b) Left arm setup for plating in the prone position

3.2 Case 2

A 31-year-old gentleman sustained posterior column + posterior wall fracture of the right acetabulum and a right tibia plateau fracture with PCL avulsion following a motor vehicle accident. Both fractures were fixed in prone position with plates and screws. (Fig. 2)

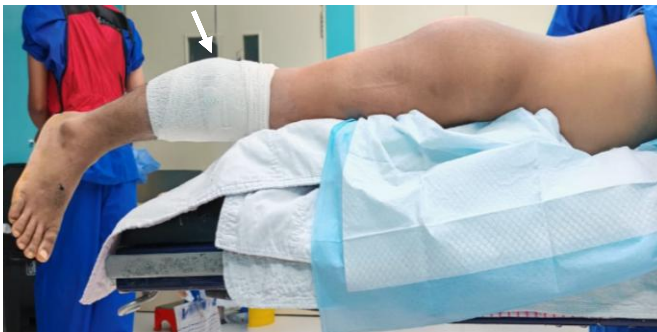

Figure 2: Prone position setup for case 2 (white arrow – surgical site for associated injury).

3.3 Case 3

This is a 44-year-old lady who had sustained a transverse + posterior wall fracture of the right acetabulum post motor vehicle accident. Using a percutaneous screw fixation technique, the anterior column was fixed in the prone position (Fig. 3). This is an alternative method in fixing the anterior column without doing an open reduction and internal fixation.

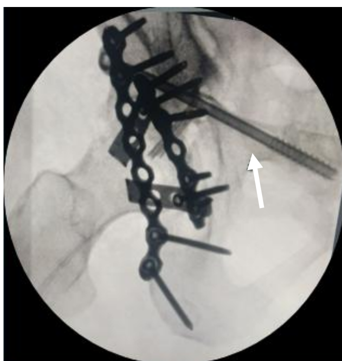

Figure 3: Fluoroscopy image taken intraoperatively showing insertion of screw (white arrow) for anterior column fixation.

3.4 Case 4

This is a 56-year-old lady who similarly sustained a transverse + posterior wall fracture of the right acetabulum following a motor vehicle accident. The difference is she had an additional fracture over the contralateral ankle, a trimalleolar fracture. In this case, we had the assistance of a foot & ankle surgeon to help fix the ankle fracture on the left lower limb. Simultaneously, the acetabulum on the right side was fixed by the primary surgeon. (Fig. 4)

Figure 4: Prone position setup for case 4. Shows 2 operating sites for simultaneous surgery. The left ankle (white arrow) and the right hip (black arrow)

3.5 Case 5

A case of a 77-year-old lady who was involved in an unfortunate event where a gate had fallen upon her. She had sustained a combined pelvic ring and acetabular injury. For the acetabulum, it was a posterior acetabular wall fracture, and the other injury was a lateral compression type pelvic ring injury (LC) with radiographic evidence of the disruption of the left sacroiliac joint. ORIF and plating was done for the acetabulum and percutaneous iliosacral screw was inserted to fix the disrupted sacroiliac joint.

3.6 Case 6

This is a case of a 28-year-old gentleman who after a motor vehicle accident sustained a combined pelvic ring and acetabular injury. For the acetabulum, it was a closed T-type + posterior wall fracture of right acetabulum and pelvic injury was a lateral compression type with left sacroiliac joint and symphysis pubis disruption. In addition, he sustained a closed distal 3rd fracture of the left humerus with an associated avulsion fracture of medial humeral condyle. By utilizing a similar position as case 1 (Fig. 1), ORIF and plating can be done for the acetabulum, stabilization of left sacroiliac joint with percutaneous iliosacral screws and plating and screw fixation for distal of left humerus.

3.7 Perioperative and Early Postoperative Observations

Postoperative radiographs demonstrated satisfactory reduction and implant positioning in all cases (Fig. 5). No immediate perioperative complications such as surgical site infection, sciatic nerve palsy, or fixation-related complications were identified from available postoperative records. In all cases, prone positioning facilitated management of associated injuries without the need for intraoperative repositioning.

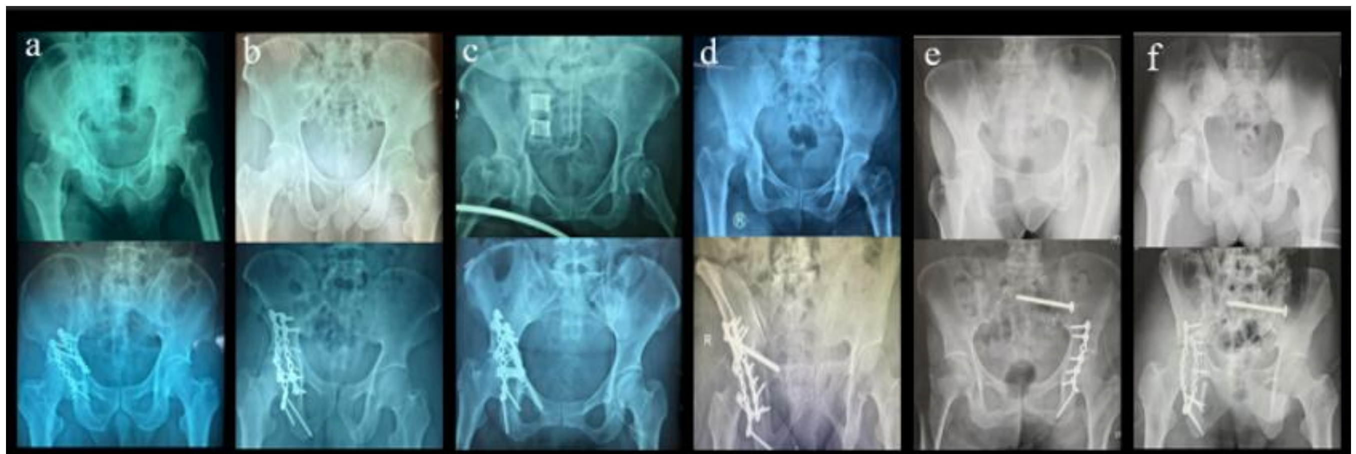

Figure 5: Pre-operational (upper row) & post-operational radiograph (lower row). a-f is case 1-6 accordingly.

Table 1: Summary of cases

Case No	Age	Gender	Acetabular fracture pattern	Associated injury	Additional Procedure in Prone
1	51	M	posterior column + posterior wall	midshaft of left humerus fracture	Plating of midshaft humerus
2	31	M	posterior column + posterior wall	Right tibia plateau fracture with PCL avulsion fracture	Tibia plateau plating + PCL screw fixation
3	44	F	transverse + posterior wall	-	Anterior column screw fixation
4	56	F	transverse + posterior wall	trimalleolar fracture	Anterior column screw fixation + Ankle fracture fixation
5	77	F	posterior wall only	LC pelvic ring injury	Iliosacral screw fixation
6	28	M	T-type + posterior wall	LC pelvic ring injury, distal 3rd left humerus, avulsion fracture of medial humeral condyle.	Iliosacral screw fixation + Distal humerus plating + Screw fixation

4. Discussion

In this report, we present 6 cases with fractures involving the posterior acetabulum that are fixed in prone position. Each case portrays different combinations of fractures and various types of acetabulum injury based on Judet Letournel's classification. Operative treatments are indicated for incongruity, as well in injuries with incarceration of fragments of bone or soft tissue within the hip joint, regardless of classification type [5]. In all cases, the posterior wall of the acetabulum is involved. If >20% of posterior wall is fractured, that might lead to instability of the hip and ORIF is indicated [6]. The aim of ORIF is to achieve accurate and congruent reduction for a successful outcome [7]. All the cases are indicated for operative intervention via posterior or K-L approach.

Both prone and lateral positioning are accepted options for the K-L approach and provide adequate exposure for fixation of posterior acetabular fractures [8]. Previous studies have not demonstrated clear superiority of one position over the other in terms of reduction quality or complication rates [9] – [11]. In the present series, prone positioning was selected because it facilitated simultaneous management of associated injuries and allowed fixation procedures to be performed without intraoperative repositioning.

Percutaneous screw fixation is one of the factors that made prone position suitable for these cases. Prior to the existence of these minimally invasive techniques, tackling a complex acetabular fracture might require a combination of an anterior and posterior standard approach [12],[13]. However, this strategy presents drawbacks such as prolonged operative time and increased blood loss without demonstrating superior outcomes compared to single approach techniques.

The use of percutaneous screw fixation of acetabular fractures is limited but associated with reduced surgical time, blood loss and fewer complications than open techniques [14],[15]. It is only recommended for non-displaced or slightly displaced fractures which are easily reduced and this technique has a long learning curve. The surgeon must be able to correctly identify the dynamic landmarks of the anterior and posterior columns of the acetabulum as well as the dome zone to safely place the screw [16].

Traditionally this technique is described to be done in supine position but there are few studies which describe the technique done in prone position [17],[18]. Doing percutaneous screw fixation in prone requires the surgeon to reorient and familiarize with the position of the bone in prone. It will be difficult at first but possible to do. It is better than attempting this technique in lateral position as there would be a lot of maneuvering the fluoroscopy machine to get the required image.

In cases 5 and 6 involving a combined pelvic ring and acetabular injuries, fixation was focused on the posterior pelvic ring using percutaneous iliosacral screws. Previous studies have demonstrated that posterior fixation alone may

provide sufficient stability in selected lateral compression pelvic ring injuries [19]. Prone positioning also facilitated simultaneous posterior pelvic stabilization without the need for intraoperative repositioning, particularly in Case 6 where contralateral iliosacral screw insertion would have been technically more difficult in the lateral position.

Although prone positioning may be associated with physiological and anesthetic considerations [20], avoiding intraoperative repositioning may help reduce operative complexity and improve workflow efficiency in selected patients with multiple associated injuries. This may consequently reduce the risk associated with prolonged operative duration [21].

The primary focus of this study was to illustrate perioperative feasibility and operative positioning strategies in selected posterior acetabular fracture with associated injuries. Long-term functional outcomes were not the principal objective of analysis. Nevertheless, no immediate postoperative complications such as infection, sciatic nerve palsy or fixation failure were identified during available follow-up.

This study has several limitations. It represents a small retrospective descriptive case series without a comparative group. The heterogeneity of fracture patterns and associated injuries also limits broader generalization of the findings. Larger comparative studies are required to further evaluate the role of prone positioning in posterior acetabular fracture surgery.

5. Conclusion

This six-case series suggests that prone positioning may be a feasible operative option for selected posterior acetabular fractures, particularly when associated injuries can be addressed without intraoperative repositioning. Larger comparative studies are needed to determine whether this approach offers measurable advantages over lateral positioning.

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