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Indian Journal of Orthopaedics Surgery

Journal homepage: www.ijos.co.in

Case Report

Management of posterior column with posterior wall acetabulum fracture and hip dislocation in a 25-year-old male: Case report

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Abstract

Acetabular fractures involving the posterior column (PC) and posterior wall (PW) are complex injuries commonly associated with high-energy trauma, such as road traffic accidents (RTAs). Such fractures, particularly when combined with posterior hip dislocation, carry a high risk of long-term complications, including avascular necrosis (AVN) and post-traumatic arthritis. This case report presents a 25-year-old male who sustained a PC with PW acetabular fracture and posterior hip dislocation following an RTA. An initial attempt at closed hip reduction failed, and the patient underwent open reduction and internal fixation (ORIF) within six hours of trauma. During surgery, a free posterior column fragment was found inside the joint, which was anatomically reduced and fixed with a posterior column plate, posterior wall plate, and an interfragmentary screw. Postoperative management involved DVT prophylaxis and early mobilization with partial weight-bearing at six weeks and full weight-bearing at 12 weeks. At the four-month follow-up, the patient showed excellent functional recovery with no complaints, and radiographs confirmed fracture union without signs of AVN or arthritis. This case emphasizes the importance of timely intervention, anatomical reduction, and structured rehabilitation in successfully managing complex acetabular fractures.

Keywords: Acetabular fractures, Hip dislocation, Posterior column, Posterior wall, Avascular necrosis (AVN), Open reduction internal fixation (ORIF), Post-traumatic arthritis.

Received: 23-10-2024; **Accepted:** 18-12-2025; **Available Online**: 04-04-2025

1. Introduction

Acetabular fractures involving the posterior column and posterior wall are frequently seen in high-energy trauma scenarios, such as road traffic accidents.[1,2] These injuries are often accompanied by hip dislocation, which exacerbates the risk of complications like avascular necrosis (AVN) of the femoral head[3,4] and post-traumatic arthritis.[5] Early anatomical reduction of the dislocated hip and stabilization of the acetabular fractures are critical to preventing these complications.[6] Studies have shown that a delay in the reduction of the hip beyond six hours increases the risk of AVN[7] and may lead to suboptimal outcomes, including early-onset osteoarthritis.[8]

In this case report, we describe the clinical course of a young male patient who sustained a posterior column and posterior wall acetabular fracture with posterior hip dislocation.[2] The case highlights the challenges in managing such injuries and emphasizes the importance of prompt surgical intervention, meticulous fracture reduction, and a comprehensive rehabilitation plan.[9,10]

2. Case Presentation

2.1. Patient information

A 25-year-old male presented to the emergency department after being involved in a high-speed motorcycle accident.[2,11] He was conscious and complained of severe pain in his right hip. The patient had no significant past medical history.[2,9]

2.2. Clinical findings

On examination, the right lower limb was found to be shortened, adducted, and in internal rotation—a clinical sign indicative of posterior hip dislocation.[2,9] The patient was

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https://doi.org/10.18231/j.ijos.2025.015

unable to move the limb due to severe pain. Neurovascular examination revealed intact distal pulses, and there was no sensory or motor deficit.[9,10]

2.3. Imaging

Radiographs and CT scans confirmed the diagnosis of a posterior column and posterior wall acetabular fracture, associated with posterior hip dislocation.[12] The scans showed a large posterior wall fragment and an intra-articular free posterior column fragment that was preventing a successful closed reduction. (**Figure 1**-**Figure 4**).[2,9]

2.4. Initial management

An emergency attempt was made to reduce the hip via closed manipulation under sedation, but this was unsuccessful due to the large intra-articular fragment.[6,9] Given the complexity of the injury, the decision was made to proceed with open reduction and internal fixation (ORIF).[2]

2.5. Surgical procedure

The patient was taken to the operating room within six hours of the trauma.[3,7] Under spinal anesthesia, the Kocher-Langenbeck (KL) approach was utilized with the patient positioned laterally.[9,11] Intraoperatively, the free posterior column fragment was identified and carefully removed from the joint space. The hip was then successfully reduced.[2,9]

The posterior column was anatomically reduced and fixed using a reconstruction plate.[9,10] The posterior wall fracture was stabilized with a posterior wall plate, and an interfragmentary screw was placed to provide additional stability. (**Figure 5**) The intraoperative reduction was confirmed with fluoroscopy, and the joint congruity was restored.[9,10]

2.6. Postoperative care

Postoperatively, the patient was placed on a regimen of antibiotics for infection prophylaxis and anticoagulation for DVT prevention.[4] Early quadriceps exercises were started on the second postoperative day. The patient was non-weight bearing for the first six weeks and transitioned to partial weight-bearing after that period.[10,13] Full weight-bearing was allowed after 12 weeks, following radiographic confirmation of fracture healing.[13]

2.7. Outcome and follow-up

At the four-month follow-up, X-rays (**Figure 6**) showed complete fracture union with no evidence of avascular necrosis (AVN) or post-traumatic arthritis.[3,7] The patient reported no pain or instability and had regained a full range of motion, allowing the resumption of daily activities without limitations.[3] As shown in (**Figure 7**), an X-ray illustrates the pelvis with visible surgical hardware, including screws and plates, attached to the right hip area for stabilization following the fracture.

The patient's postoperative progress was further demonstrated through functional recovery images, such as sitting cross-legged (**Figure 8**), performing straight leg raises (SLR) (**Figure 10**), and climbing stairs independently. (**Figure 11**)[12] Follow-up radiographs (**Figure 9** and **Figure 10**) confirmed the hardware remained intact and in proper alignment, with no signs of complications.[9]

Here are legends for each image based on typical descriptions for radiological images of the hip and pelvis:

Figure 1: X-ray of the left hip showing a fracture at the femoral head/neck region. The alignment and positioning of the bones can be observed, with a displacement due to fracture

Figure 2: 3D CT scan rendering of the left hemipelvis. This view focuses on the acetabulum, showing detailed bone structure and providing a clear visualization of fractures in the hip socket region

Figure 3: 3D CT scan of the pelvis from a posterior view. This image shows both hips and the sacrum, giving a comprehensive view of the pelvic structure and alignment. The details of the hip joints and the sacroiliac joints are visible, useful for assessing bilateral symmetry and structural integrity

Figure 4: 3D reconstruction of a pelvic CT scan showing a complex fracture of the acetabulum. The image highlights a break in the pelvic bone, indicating the severity of the trauma and displacement.

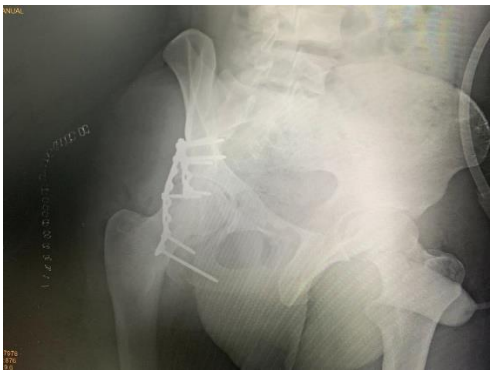

Figure 5: X-ray image of the pelvis post-surgery, showing fixation of the acetabular fracture with multiple screws and plates. This image demonstrates the stabilization achieved through internal fixation.

Figure 6: Postoperative x-ray of the pelvis from a different angle, displaying the alignment and position of the orthopedic hardware used for fixation. This view provides further assessment of the fracture repair and hardware placement.

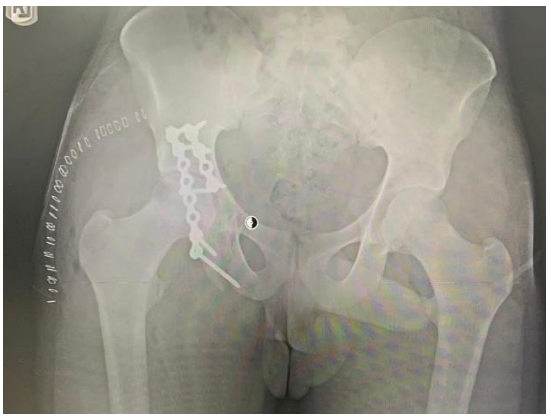

Figure 7: An x-ray showing the pelvis with visible surgical hardware attached to the right hip area, including screws and plates used for stabilization, after a fracture

Figure 8: A patient sits on the floor with legs crossed, demonstrating post-surgery mobility in the hip and lower limbs. This position may indicate progress in recovery and flexibility after surgery

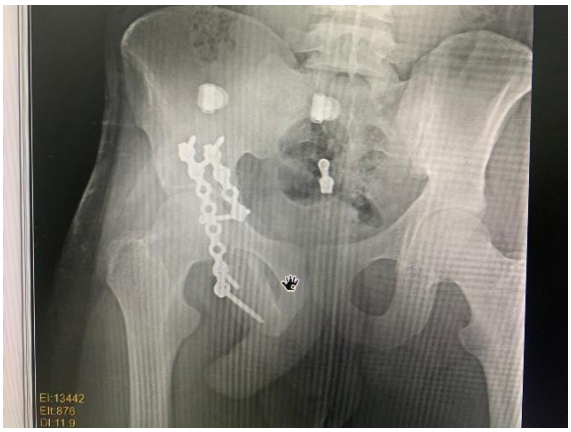

Figure 9: A follow-up X-ray of the pelvis showing surgical hardware in the hip region. This includes screws and plates that stabilize the hip, related to the patient's surgical intervention. The image shows the alignment and healing progress of the hip and pelvic bones

Figure 10: The patient is lying on their back and performing SLR, confirming the movement achieved after fracture fixation

Figure 11: The patient walking up a set of stairs during post-operative recovery from an acetabular fracture fixation. Stair climbing show independence and functional mobility

3. Discussion

Acetabular fractures involving the posterior column and posterior wall are particularly challenging due to their association with high-energy trauma and the risk of complications.[2,9,12] The combination of these fractures with hip dislocation further complicates the management, as delayed or inadequate treatment may result in long-term disabilities.[3,9]

The primary concern in these injuries is the development of avascular necrosis (AVN) of the femoral head,[3] which is associated with delayed reduction of the dislocated hip.[7] Studies suggest that hip reductions performed within six hours of injury significantly reduce the risk of AVN, with incidences reported to range from 4% to 27% in various studies. In the present case, the hip was reduced within six hours, which likely contributed to the absence of AVN at the four-month follow-up.[7]

Another significant complication is post-traumatic arthritis, which is often seen in cases where the posterior wall is involved.[5,12] Anatomical reduction of the fracture fragments is critical to preserving the congruency of the hip joint and minimizing the risk of arthritis. In this case, the posterior column and posterior wall were reduced anatomically, resulting in excellent clinical outcomes.[3,12]

The approach to fixation in posterior column and posterior wall acetabular fractures varies based on the fracture pattern.[11,10] The Kocher-Langenbeck approach is widely regarded as the gold standard for accessing the posterior acetabulum.[2] This approach allowed for adequate visualization and manipulation of both the posterior column and posterior wall in this case, facilitating a successful ORIF.[9-11]

Early mobilization and a structured rehabilitation protocol are essential for recovery in such cases.[4] In our patient, early quadriceps exercises were initiated postoperatively to maintain muscle strength, and weight-bearing was gradually progressed over 12 weeks to ensure proper fracture healing.[10,13] This approach helped prevent joint stiffness and facilitated a smooth recovery.[3,4]

The long-term prognosis of such fractures depends largely on the quality of the reduction and fixation, as well as the patient's adherence to the rehabilitation protocol.[4] While the patient in this case achieved an excellent outcome at the four-month follow-up, long-term monitoring is necessary to detect any delayed complications such as AVN or post-traumatic arthritis.[3,5]

3.1. Literature comparison

The management of acetabular fractures involving the posterior column and posterior wall has been extensively reviewed in the literature, emphasizing the need for prompt intervention and accurate surgical techniques.[2,12] Letournel's classification system is widely accepted, highlighting the significance of the fracture pattern in determining the approach to treatment.[2] Various studies indicate that anatomical reduction is paramount to avoid complications

such as AVN and post-traumatic arthritis.[3,5] For example, Koval et al. reported that anatomical fixation significantly reduces the risk of degenerative changes postoperatively.[11] In our case, the use of the Kocher-Langenbeck approach allowed for direct visualization and reduction of both the posterior column and wall, aligning with the findings of Gansslen et al. that suggest this approach is optimal for similar fractures.[10]

Additionally, studies show that early weight-bearing after surgical fixation is critical for functional recovery, echoing the structured rehabilitation protocols noted in recent literature.[3,12] Overall, the management strategies employed in this case align with current best practices and literature recommendations, further substantiating the successful outcome.[4,7]

4. Conclusion

The successful management of a posterior column and posterior wall acetabular fracture with hip dislocation requires a prompt and meticulous approach, including timely surgical intervention, anatomical reduction, and a comprehensive rehabilitation protocol. This case report illustrates that with appropriate surgical techniques and postoperative care, excellent functional outcomes can be achieved, even in complex acetabular fractures.

5. Source of Funding

None.

6. Conflict of Interest

None.

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Cite this article: Patel PR, Kanani H. Management of posterior column with posterior wall acetabulum fracture and hip dislocation in a 25-year-old male: Case report. *Indian J Orthop Surg*. 2025;11(1):71–75.