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Case Report

Management Challenges in AdultPosterior Acetabular Fracture-Dislocation with Femoral Head Resorption: A Case Report

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Abstract:

Introduction: Adult acetabular fractures with associated posterior hip dislocation present with significant challenges due to the complexity of the anatomy and potential for long-term complications. This report describes the management of a 50-year-old male who sustained a comminuted posterior acetabular rim fracture with posterior dislocation and subsequent femoral head resorption.

Case Presentation: The patient presented with left hip pain and inability to bear weight following a fall from a height. Imaging confirmed a posterior dislocation of the femoral head with a comminuted posterior acetabular fracture. Urgent closed reduction and skeletal traction were performed.

Definitive acetabular plating was planned, but intraoperative findings revealed severe femoral head resorption, necessitating excision of the femoral head and abandonment of plating. The patient underwent non-weightbearing rehabilitation. Three months later, a custom total hip replacement (THR) was performed as definitive management, resulting in substantial functional improvement.

Conclusion: This case highlights the challenges of managing adult hip injuries complicated by femoral head resorption. Early recognition of complications such as avascular necrosis (AVN) is critical. In THR, advancements in prosthetic design have improved outcomes. This case demonstrates the importance of a flexible, multidisciplinary approach to achieve optimal results in such complex cases. Femoral head resorption following traumatic hip dislocation and acetabular fractures in adult patients requires individualized management. Total hip replacement can provide significant functional recovery, even in young patients, when other surgical options are exhausted.

Keywords: Adult Hip Dislocation, Acetabular Fracture, Femoral Head Resorption, Avascular Necrosis, Total Hip Replacement.

Introduction

Traumatic injuries involving the hip joint with acetabular fractures and posterior hip dislocations occurring infrequently due to the inherent flexibility and resilience of the developing skeleton. [1,2] These injuries, however, pose a significant challenge to orthopedic surgeons due to the complexity of the anatomy, the potential for long-term morbidity, and the lack of standardized treatment protocols for adult patients. [3] In particular, cases involving comminuted acetabular fractures and complications such as femoral head resorption present unique management dilemmas, often necessitating a multi-stage approach to restore functionality and prevent future complications.

The acetabulum, a crucial component of the pelvic girdle, plays an essential role in the stability and mobility of the hip joint. Fractures of the acetabulum, particularly those involving the posterior rim, are frequently associated with high-energy trauma and can result in posterior dislocation of the femoral head. Immediate management typically involves urgent reduction of the dislocation and stabilization of the fracture, followed by a thorough evaluation to determine the need for surgical intervention. [4,5] While acetabular fractures in children are uncommon, the growing skeleton and associated risks of growth disturbances make the long-term management of these injuries particularly challenging.

Femoral head resorption is an exceedingly rare but devastating complication of posterior dislocation and acetabular fractures. Resorption is thought to result from avascular necrosis (AVN) due to disruption of the femoral head's blood supply

during the injury. [6] The natural history of femoral head

resorption is poorly understood, but the loss of the femoral head can significantly impair joint function, leading to substantial pain, leg-length discrepancy, and early degenerative changes. Addressing this issue often requires complex surgical interventions, including joint replacement, even in young patients, to achieve satisfactory outcomes.

This case report highlights the management of a 50-year-old male who sustained a closed comminuted posterior rim fracture of the acetabulum with posterior dislocation of the femoral head, complicated by femoral head resorption. The initial treatment involved closed reduction of the dislocation and traction, with plans for acetabular plating. However, intraoperative findings revealed significant resorption of the femoral head, necessitating its excision and abandonment of acetabular plating. Definitive management involved delayed total hip replacement (THR), emphasizing the complexity of decision-making in such cases.

This report aims to illustrate the challenges of treating complex adult acetabular injuries, the decision-making process involved in balancing short- term stabilization with long-term outcomes, and the role of THR in young patients. By exploring this case, we also emphasize the importance of early recognition of complications such as femoral head resorption and the need for a multidisciplinary approach to optimize outcomes in these rare but impactful injuries.

Case

Patient Presentation: A 50-year-old male child presented to the emergency department with complaints of severe left hip pain and inability to bear weight following a fall from a height of approximately five feet while playing. There was no reported history of loss of consciousness, seizures, or other injuries. The child's parents confirmed no prior medical history of joint or bone disorders. Physical examination revealed a left lower limb in a shortened, internally rotated, and adducted position, consistent with posterior hip dislocation. The child was hemodynamically stable.

Initial Investigations and Management: Radiographic evaluation, including plain X-rays and computed tomography (CT), confirmed a posterior dislocation of the left femoral head with a closed comminuted fracture of the posterior rim of the acetabulum. The femoral head appeared partially displaced into the pelvic cavity. A preliminary Doppler ultrasound suggested compromised blood flow to the femoral head, raising concerns about potential avascular necrosis (AVN).

In the emergency setting, an urgent closed reduction of the posterior dislocation was performed under sedation. Post-reduction imaging demonstrated successful relocation of the femoral head with a persistent posterior acetabular defect. The patient was placed in skeletal traction to maintain alignment, and further management plans were deferred until subspecialty evaluation by orthopedic trauma surgeons.

Surgical Planning: After multidisciplinary discussions, definitive management with open reduction and internal fixation (ORIF) of the acetabular fracture using plating was planned. Preoperative imaging showed significant comminution of the posterior acetabular rim but no overt signs of AVN or significant femoral head damage. The primary goal was to reconstruct the acetabulum and ensure joint stability to preserve hip function and prevent future dislocations.

Intraoperative Findings: During the surgical exploration, a startling finding was encountered: the femoral head appeared severely compromised, with significant resorption likely secondary to ischemia from the initial trauma. The head was markedly deformed and structurally unsalvageable, rendering acetabular plating futile. After intraoperative consultations with the orthopedic team, the decision was made to excise the femoral head. The acetabular plating procedure was abandoned as it no longer aligned with the modified surgical goals.

The child's hip joint was temporarily stabilized using soft tissue interposition to maintain some joint integrity. A decision was made to delay definitive management to allow the acetabulum and surrounding tissues to heal before proceeding with reconstructive surgery. Postoperative recovery was uneventful, and the patient was discharged with instructions for non-weight- bearing mobilization and close outpatient follow-up.

Follow-Up and Definitive Management: Over the next three months, the patient was monitored closely with serial imaging and clinical evaluations. X-rays demonstrated healing of the acetabular fracture with partial remodeling of the bony architecture, but the absence of the femoral head precluded any functional hip joint activity. The patient began to develop significant gait abnormalities and limb-length discrepancy. Pain was controlled with nonsteroidal anti-inflammatory drugs (NSAIDs), and physical therapy was initiated to maintain mobility in the adjacent joints.

Given the patients age and the severity of the hip pathology, the orthopedic team decided to proceed with a total hip replacement (THR) as a definitive

solution. This decision was made after careful consideration of the risks and benefits, including potential challenges of revision surgery in the future.

Surgical Reconstruction: Three months post-initial surgery, the patient underwent a total hip replacement using a custom sized prosthetic. The surgical approach was designed to minimize soft tissue disruption and preserve as much of the acetabular bone stock as possible for future revisions if necessary. A cementless acetabular cup and a modular femoral stem were selected to accommodate the skeleton. Intraoperative findings confirmed good integration of the surrounding bone with no signs of infection or inflammation.

Postoperatively, the patient was placed on a rehabilitation protocol tailored to his age, focusing on muscle strengthening, range of motion, and gradual weight-bearing. By the six-month follow-up, the patient demonstrated significant improvement in mobility, with near-complete resolution of pain and a well-aligned hip joint on radiographs.

Figure 1: Post operative xray after femoral head excision

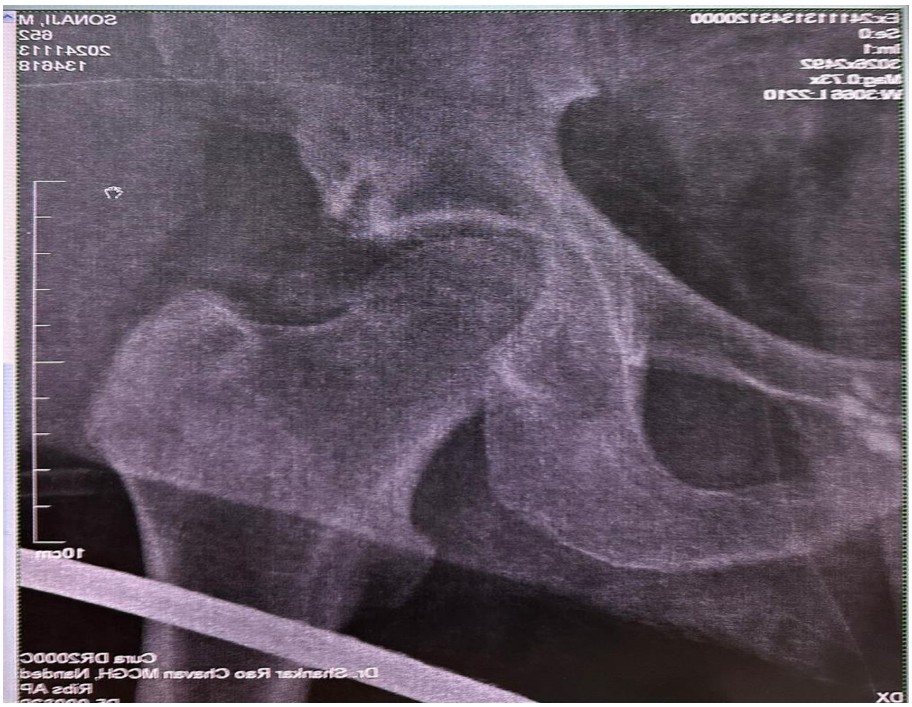

Figure 2: Pre operative xray before femoral head excision

Intra operative excision of resorbed femoral head

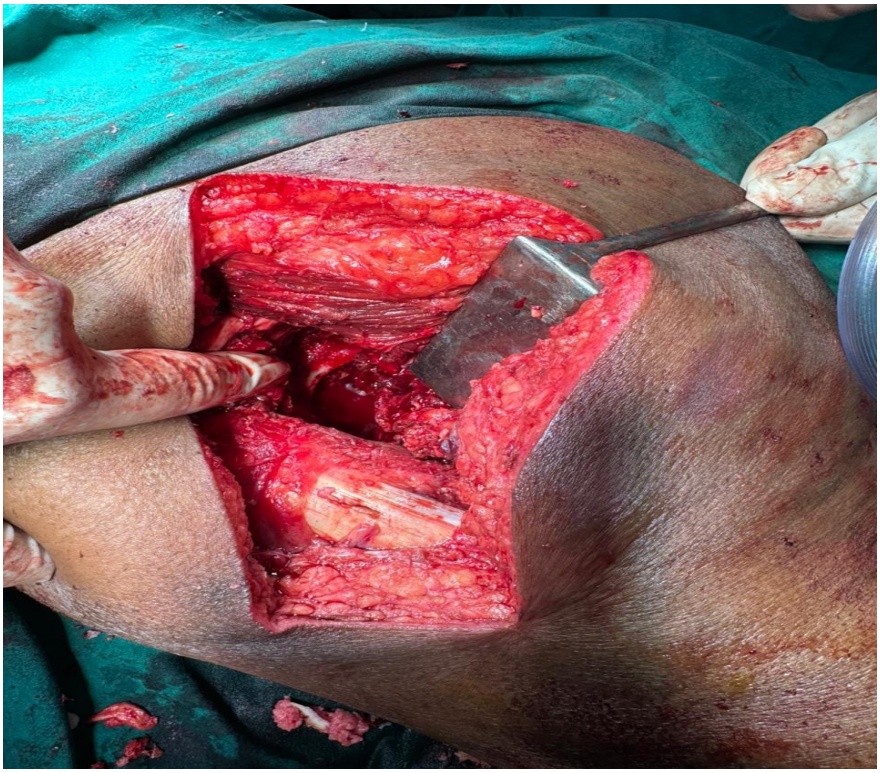

Figure 3:

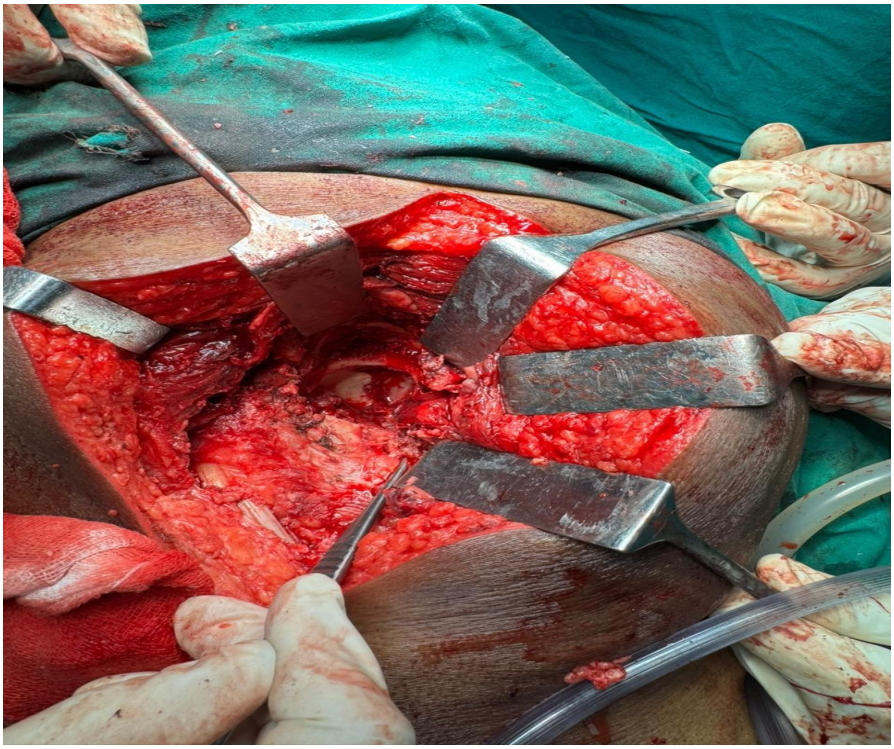

Figure 4:

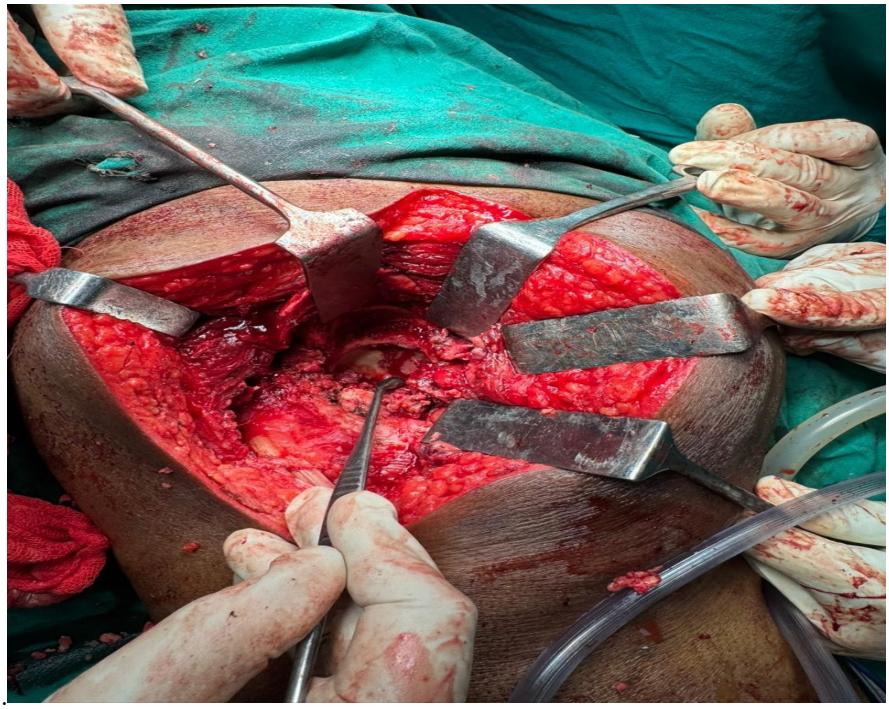

Figure 5:

Outcome: At the one-year follow-up, the patient was ambulating independently with a stable hip joint and no signs of prosthetic loosening or complications with no significant discrepancies in limb length, and the patient reported no pain or discomfort during physical activities. Long-term plans included routine monitoring for prosthetic wear and early detection of potential complications such as loosening or growth-related misalignment.

Discussion

Adult hip injuries, particularly those involving acetabular fractures with posterior dislocation of the femoral head, are common but present significant clinical challenges. These injuries necessitate prompt and precise management to prevent long-term complications.

Incidence and Mechanism: Traumatic hip dislocations in adult with posterior dislocations being the most prevalent, often resulting from high-energy impacts such as falls from significant heights or motor vehicle accidents. [7] The acetabulum and the strength of surrounding soft tissues generally protect against dislocation. [8] However, when substantial force is applied, the posterior rim of the acetabulum can fracture, leading to posterior dislocation of the femoral head. In severe cases, this can disrupt the blood supply to the femoral head, resulting in avascular necrosis (AVN) and subsequent resorption of the femoral head. [9]

Initial Management: Immediate reduction of the dislocated hip is critical to restore joint congruity and minimize the risk of AVN. Closed reduction under general anesthesia is typically the first line of treatment. Post-reduction imaging is essential to confirm proper alignment and to identify any associated fractures or intra- articular fragments. In cases where closed reduction is unsuccessful or if there are incarcerated fragments, open reduction may be necessary.[10–14]

Complications: Avascular necrosis of the femoral head is a significant complication following traumatic hip dislocations, with incidence rates reported between 5% and 40%. The risk of AVN increases with delayed reduction of the dislocation. In adult patients, AVN can lead to resorption of the femoral head, resulting in joint instability and functional impairment. [15–17]

Definitive Management: The management of acetabular fractures aims to achieve anatomical reduction and stable fixation to allow for early mobilization and to minimize the risk of post-traumatic arthritis. However, the presence of femoral head resorption complicates this approach. In such scenarios, options include femoral head excision (Girdlestone procedure) or prosthetic replacement. Nonetheless, advancements in implant design and surgical techniques have made THA a more viable option for patients with severe hip pathology. [10–12,18]

Outcomes of Total Hip Arthroplasty in Children

Recent studies have reported favorable outcomes for THA in the adult population. A single center retrospective review analyzing THA outcomes in patients found significant improvements in function and pain relief, with implant survival rates. [19,16]

Another study focusing on cementless ceramic-on-ceramic THA in children and adolescents reported excellent clinical and radiographic outcomes, with high implant survival rates and low complication rates. [11]

This case highlights the complexities involved in managing acetabular fractures with associated posterior hip dislocation and femoral head resorption. Early recognition and prompt reduction of dislocations are crucial to minimize complications such as AVN. In cases where femoral head resorption occurs, THA can be a viable option, offering significant functional improvement and pain relief. However, careful patient selection, meticulous surgical technique, and long-term follow-up are essential to optimize outcomes in this challenging patient population.

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