

Superolateral Anterior Hip Dislocation with Acetabular Fracture: Report of Three Cases and Review of Literature

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Abstract

Anterior hip dislocation is less common than posterior and is classified as obturator (perineal), pubic, or iliac type. Type of dislocation is influenced by the position of lower limb at the time of injury and forces involved. Superolateral (iliac) type of anterior dislocation is extremely rare and often mistaken for posterior dislocation. Techniques for reducing an anterior dislocation vary with the type. Even though, in general, anterior dislocations have favorable outcome, the presence of associated acetabular injuries and timing of reduction after the injury can influence long-term outcome. Prompt and gentle maneuvers and avoiding repeated attempts at closed reduction further help to improve the prognosis.

Keywords: Hip, Dislocation, Anterior, Superior, Iliac, Acetabulum.

Introduction

The hip joint, one of the most stable joints in the human body, owes it to the deep acetabular cavity margined by the labrum, the capsule with surrounding ligaments, and the short external rotators of hip [1]. Dislocations of hip occur due to high-energy trauma and majority of times the femoral head dislocates posteriorly. Anterior dislocation constitutes around 10% of hip dislocations [2, 3, 4]. Due to the presence of strong iliofemoral ligament anteriorly, the femoral head tends to dislocate superior or inferior wards when it comes out anteriorly. The superior dislocation is further subclassified as medial (pubic) or lateral (iliac) type [2, 4]. The superolateral (iliac) type of anterior dislocation is extremely rare and is often

misdiagnosed as a posterior dislocation [2]. Only seven cases of true superolateral anterior dislocation of the hip have been reported in English literature so far. We are reporting here three cases of superolateral anterior hip dislocation associated with acetabular fractures and discussing the pathomechanics, clinical presentation, radiological characteristics, reduction techniques, and possible complications associated with the dislocation.

Case Report

Case 1

A 54-year-old male, pedestrian, was hit by car from behind and brought to the emergency department with pain around the right hip and inability to bear weight on the right lower limb. On examination, he was conscious, alert, and hemodynamically stable. The right lower limb was abducted, externally rotated, and shortened (Fig. 1a). A hard mass was palpable under the right anterior superior iliac spine (ASIS). Movements of the right hip were grossly restricted. Distal pulses were normal. Pelvic radiographs revealed

anterior dislocation of the right hip with the femoral head lying superior and lateral to acetabulum and posterior acetabular rim fracture (Fig. 1b and c). The lesser trochanter was completely superimposed and not visualized. He underwent closed reduction of hip within 3 h of injury (Fig. 1d). Reduction was achieved by traction in line of femur (flexion and abduction), mild lateral traction on upper thigh, and gradual internal rotation. Post-reduction computerized tomography (CT) confirmed a minimally displaced posterior acetabular fracture, undisplaced anterior rim fracture, and a small bony fragment near the fovea, most likely representing an avulsed ligamentum teres (Fig. 2a and b). An upper tibial skeletal traction was applied for 3 weeks after which non-weight-bearing crutch walking was started. At 4 months, after fresh radiographs and a negative bone scan, he was permitted weight bearing. Now, 5 years after the injury, he is asymptomatic without radiological evidence of avascular necrosis and arthritis of the injured hip (Fig. 2c).

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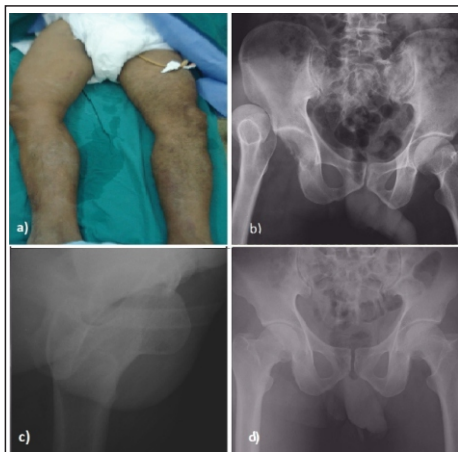


Figure 1: Case 1. a) Attitude of lower limb. b) and c) AP and lateral radiographs showing superolateral hip dislocation. d) Radiograph showing congruent reduction of hip joint.

Case 2

A 36-year-old male was brought to the emergency department after road traffic accident (RTA). He complained of pain around the right hip and was unable to bear weight on that side. His right lower limb was shortened and lying in abducted and externally rotated attitude. There was no distal neurovascular deficit. Radiographs showed superolateral anterior dislocation of the right hip and associated posterior acetabular wall

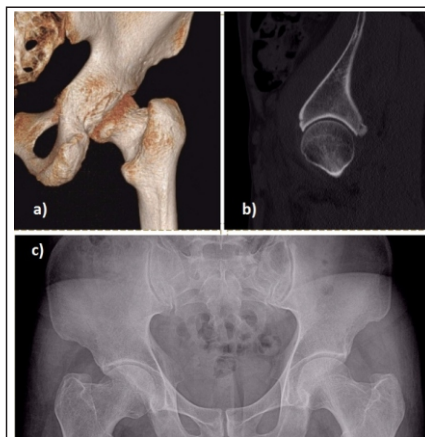


Figure 2: Case 1. a) and b) CT scan of Hip showing posterior acetabular rim fracture. c) No evidence of AVN of femoral head or hip joint osteoarthritis at 5 years follow up.

fracture (Fig. 3a). He underwent emergency closed reduction under general anesthesia within 4 h of injury (Fig. 3d). Closed reduction was attempted twice with longitudinal traction in line with the femur (flexion and abduction), gentle lateral traction at upper thigh, and internal rotation. At the end of the second attempt, the hip suddenly went into an attitude of posterior dislocation which was confirmed with fluoroscopy. Thereafter, reduction was achieved with continuous traction in flexion and adduction

followed by external rotation. Reduction was checked under fluoroscopy and an upper tibial skeletal traction was applied. Post-reduction CT scans were done to delineate the acetabular fracture (Fig. 3b and c). 1 week later, open reduction and internal fixation of the posterior acetabular fracture was done along with the removal of the intra-articular loose fragments (Fig. 4a). The patient was kept non-weight-bearing for 3 months followed by partial weight-bearing with crutches for another 3 months. 3 and ½ years down the lane,



Figure 3: Case 2. a) Radiograph showing Superolateral hip dislocation with acetabular fracture. b), c) and d) Post reduction CT scan and radiograph showing congruent reduction of hip joint with acetabular posterior wall fracture and multiple intra-articular loose bodies.

acetabular fracture union was noted without evidence of osteonecrosis and arthritis (Fig. 4b).

Case 3

A 24-year-old male presented with pain and deformity of the left lower limb following a RTA. His left lower limb was in a flexed, abducted, and externally rotated attitude (Fig. 5a). There was no distal neurovascular deficit. Radiographs showed superolateral type of dislocation of the left hip with bicolumnar fracture of acetabulum and suspicious intra-articular fragment (Fig. 5b and c). He was taken up for emergency closed reduction. Despite three attempts to reduce the dislocation as for an anterior dislocation, the hip could not be reduced. Hence, it was decided to convert it into a posterior dislocation, and thereafter, reduction was achieved with longitudinal traction, flexion, and adduction. Concentric reduction was not obtained and intra-articular fragment was noted (Fig. 5d). A CT scan was done which showed displaced posterior column and undisplaced anterior column fractures with intra-articular fragments (Fig. 6a and b). He underwent open reduction

Table 1: Epstein's classification of hip dislocation [4, 5]

Hip dislocation	
Type I - Anterior	Type II - Posterior
Superior	Inferior
Type A - No associated fracture	Type A - No associated fracture
Type B - Associated femoral head fracture	Type B - Associated femoral head fracture
Type C - Associated acetabular fracture	Type C - Associated acetabular fracture

Table 2: Reduction techniques for anterior hip dislocation [5]

Name	Characteristic features
Allies maneuver	Longitudinal traction on the flexed and abducted femur followed by adduction and internal rotation of thigh along with pressure against the femoral head to guide it into the acetabulum Generally preferred
Bigelow's circumduction technique	Along with longitudinal traction, the abducted and externally rotated femur is further flexed, adducted, and internally rotated and finally extended Can enlarge the capsular tear and drive fragments into the joint. Hence less preferred
Epstein's technique	Traction in line of femur followed by gentle flexion and internal rotation. Warns against adducting the hip till reduction is achieved

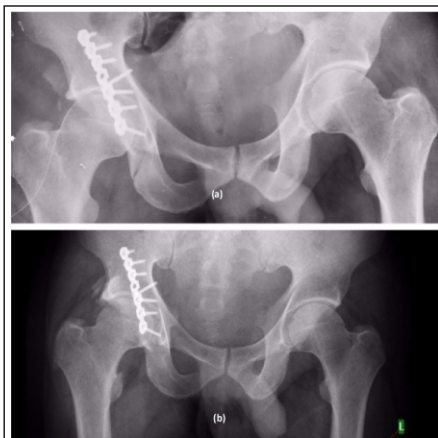


Figure 4: Case 2. a) Radiograph Showing posterior wall fixation of acetabular fracture (Immediate-postoperative). b) Follow up at 3.5 years without any evidence of AVN or osteoarthritis.

of the posterior column fracture with removal of the intra-articular fragments (Fig. 6c). An abduction brace was provided and non-weight-bearing gait training with axillary crutches was started. Partial weight-bearing was started after 4 months. At 18-month follow-up, his fractures had united and there was no evidence of avascular necrosis of the head of femur (Fig. 6d).

Discussion

Significant force is required to dislocate the otherwise stable hip joint in adults. However, hip dislocation with low-energy trauma has been reported in children due to their ligamentous laxity and pliable cartilage [1]. Anterior dislocation of the hip constitutes only 5–11% of hip dislocations and is subdivided into superior [10%] (pubic or iliac) and inferior [90%] (obturator or perineal) types depending on the relation of femoral head to acetabular cavity (Table 1) [2, 3, 4, 5]. Superolateral type of anterior dislocation is the rarest of all hip dislocations and very few cases have been reported till date. One case each reported to be superolateral type by Bassett et al. and de Muelenaere appeared as superomedial on radiographs [6, 7]. In anterosuperior



Figure 5: Case 3. a) Attitude of the limb. b) and c) Radiograph confirming it to be a Fracture dislocation of hip joint - superolateral type. d) Radiograph showing non-congruent reduction with bicolumnar fracture of acetabulum.

dislocation, the femoral head exits between the iliofemoral and pubofemoral ligaments or avulses the iliofemoral ligament from the anterior inferior iliac spine. In anteroinferior dislocation, the head comes out between the pubofemoral and ischiofemoral ligaments and lies over the obturator ring [2, 4]. The direction of hip dislocation is influenced by the position of the lower extremity at the time of impact and the forces involved [4]. Majority of anterior hip dislocations occur due to RTA when the limb goes into abduction and external rotation levering the femoral head out of the acetabulum [7, 8, 9, 10]. An anterior superior dislocation results when, along with abduction and external rotation, the hip is in extension, and anterior inferior dislocation occurs when the hip is in flexion. With more abduction, the head is displaced superomedially (pubic) and with less abduction superolaterally (iliac) [7, 8]. The anteriorly dislocated limb has an abducted and externally rotated attitude. In anterosuperior

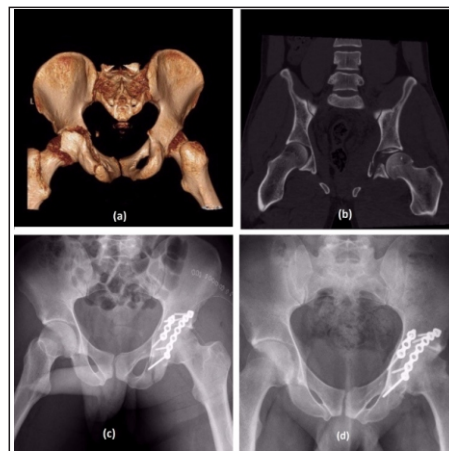


Figure 6: Case 3. a) and b) 3D Ct scan showing displaced posterior column fracture and undisplaced anterior column fracture with intra-articular fragments. c) Open reduction and internal fixation of acetabular fracture addressing both columns. d) Follow up at 18 months.

dislocation (pubic and iliac), the limb appears shortened, and in inferior dislocation, it is lengthened. In superolateral type, the dislocated femoral head could be palpated as a mass just below the ASIS, whereas in superomedial type in the inguinal region and in inferior type in the groin [7, 8]. On anteroposterior (AP) radiograph, the superolateral anterior dislocation is easily mistaken for posterior dislocation. However, a prominent lesser trochanter due to the external rotation and an abducted attitude of the femoral shaft help in differentiating from posterior dislocation where the lesser trochanter is less prominent and shaft is adducted

Table 3: Long-term complications of anterior hip dislocation [1, 4, 7, 8, 14, 15, 17]	
Complication	Features
Avascular necrosis	Common complication 4–6% incidence if hip is reduced within 6 h of injury Incidence rises to nearly 50% if reduction is delayed >6 h
Secondary degenerative arthritis	Common complication Incidence around 17% Usually develops within 5 years after the injury Risk increased with severity of initial trauma, indentation fractures of femoral head of >4 mm depth, acetabular fractures, intra-articular loose fragments, and forceful and multiple closed reduction maneuvers
Hip instability	Due to undiagnosed labral tear MRI is helpful in diagnosis Can be arthroscopically repaired or debrided
Coxa magna	Usually in children
Premature physeal fusion	Usually in children Can lead to trochanteric overgrowth and Trendelenburg gait
Heterotrophic ossification	Incidence around 3–4% Dependent on initial soft tissue injury

MRI: Magnetic resonance imaging

[2, 7]. If the limb is excessively externally rotated as in our first case, the lesser trochanter gets superimposed completely and may not be helpful in diagnosis. Hence, it is always important to do a lateral radiograph in all cases to confirm the diagnosis. The magnified appearance of femoral head on an AP radiograph described by some authors is unreliable [2, 7]. Recently, dynamic digital rotational imaging is recommended if there are associated acetabular fractures as it can be done without changing the position of the patient and has advantage over standard Judet views [4]. Although traumatic hip dislocation is a surgical emergency, other life-threatening injuries must be given priority and stabilized first. It is very important to have good analgesia and muscle relaxation to facilitate smooth and successful closed reduction. Several reduction techniques have been described in literature to reduce anterior hip dislocation, with slow steady longitudinal traction in line with the flexed and abducted femur common in all techniques (Table 2). In both our cases, we stabilized the pelvis and gave strong longitudinal traction on the flexed and abducted femur followed by internal rotation. In addition, we gave a small lateral traction at the upper thigh as we feel it helps to dislodge the femoral head of the acetabular rim and prevents abrasive cartilage injury during reduction. However, in our second case, the hip suddenly went into posterior dislocation which we feel happened because we internally rotated and adducted the hip before it came in line with the acetabulum. Few authors have suggested converting an anterior dislocation to a posterior type and reduce accordingly [11]. Although in our second case this happened accidentally, in our third case, we employed this method to reduce the hip after initial failed attempts. Hence, we feel that if reduction is not achieved by the standard techniques described for

anterior dislocation, one should not hesitate to convert it into a posterior dislocation and reduce thereafter. Failure to achieve closed reduction includes buttonholing through the capsule, interposition of soft tissue, or large intra-articular bony fragments or the head getting trapped by the iliopsoas or between the iliofemoral and pubofemoral ligaments [12]. Post-reduction we persisted with the standard way of traction and delayed weight-bearing. However, several recent studies have shown better results and no deleterious effects from early mobilization [13, 14]. Associated injuries include impaction fractures of the femoral head (35–55%), fractures of the acetabulum (femoral neck, greater trochanter (7) or shaft of femur (2,4), avulsion fractures of the anterior superior and anterior inferior iliac spines [15], avulsion of the anterior labrum or tear of anterior capsule [15], and damage to the femoral neurovascular bundle (1%). Acetabular fractures usually occur when the head is exiting out [2, 7, 13]. No definite fracture pattern is seen in acetabular fractures associated with anterior superior dislocation. As noted in our patients, varying fracture patterns involving anterior or posterior wall and/or columns can occur. A case of superior dislocation with posterior acetabular wall fracture by Chada et al. and superior dislocation with anterior column fracture by Nipun et al. has been reported earlier. When the femoral head exits out anteriorly due to the forced abduction and external rotation, it can cause a pure anterior acetabular fracture. Trochanteric impingement or an initial posteriorly directed axial force on a semi-flexed hip can cause a posterior acetabular fracture. When the same force continues, due to inertia the upper trunk moves forward taking the limb into extension and external rotation and can result in an anterior acetabular fracture as well [16]. Once

the dislocation is reduced definitive management of the acetabular fracture can be undertaken at a later date after doing CT scans with three-dimensional reconstruction and planning. Open reduction and anatomic reconstruction of the acetabulum is best done within 7–10 days after injury. Too early fixation is associated with increased risk of infection. Similarly, several authors have also shown difficulty in reducing the fragments after 3 weeks. Matta et al. recommended that better long-term result could be achieved if the congruency of femoral head to the weight-bearing dome is restored and the fracture is reduced to <3 mm gap [4]. Long-term complications following anterior dislocation of the hip are many (Table 3). Overall, anterior dislocations have better prognosis than posterior and central dislocations [13, 17]. The long-term prognosis is determined by the direction of dislocation, severity of initial trauma, associated femoral head or acetabular fractures, and timing of reduction from injury. The timing of reduction and reduction maneuvers is the only factors in surgeon's control. However, it needs to be understood that though hip reduction within 6 h of injury is recommended, complications still occur despite early reduction as they are also dependent on initial trauma and associated injuries [14].

Conclusion

The superolateral type of anterior dislocation is rare injury which occurs when the hip goes into abduction, extension, and external rotation and can be confused with posterior dislocation on an AP radiograph. Hence, it is important to get a cross-table lateral view of hip to confirm the direction of dislocation. Associated anterior or posterior acetabular wall or column fracture can occur. Closed reduction of the superolateral dislocation can be facilitated with additional gentle lateral traction on the upper thigh along with

longitudinal traction of the flexed and abducted femur. Premature adduction of the hip can displace the femoral head posteriorly. If failure to reduce superolateral anterior dislocation by standard reduction technique it can be converted to posterior dislocation and then reduced. Recent studies encourage

early non-weight-bearing mobilization of the patient after reduction. Better outcomes can be expected in isolated anterior hip dislocations if early and gentle reduction is achieved. However, guarded prognosis must be given in the context of high-velocity injury, delayed reduction, open reduction, persistence

of intra-articular loose fragments, associated femoral head or acetabular fractures, and in children. These patients must be followed up for at least 5 years to rule out early-onset degenerative arthritis.

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