

Locked Anterior Hip Dislocation with Ipsilateral Greater Trochanteric Fracture and Common Femoral Artery Compression: A Rare Case Report

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ABSTRACT

We report a rare case of post-traumatic anterior hip dislocation with ipsilateral greater trochanteric fracture and compression of the common femoral artery. To our knowledge, this is the first report that highlights a rare pubic anterior dislocation with greater trochanter fracture complicated with a pale, pulseless limb. Additionally, after two unsuccessful closed manipulative reduction (CMR) attempts, an urgent open reduction was performed, which resulted in an immediate recovery of the distal circulation. We emphasize the need for urgent open reduction following failed CMR. A delayed open reduction that was carried out 12 hours after the injury may have contributed to the surgical site infection, avascular necrosis, and heterotopic ossification that developed in our case.

Keywords

hip dislocation, avascular necrosis, pale pulseless limb

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INTRODUCTION

Traumatic hip dislocation in children is uncommon.¹ Anterior and posterior hip dislocations are two types of traumatic hip dislocations, with the latter being more prevalent.¹⁻⁵ There has never been a description of a pubic type anterior hip dislocation with ipsilateral common femoral artery compression and a pale, pulseless limb. Urgent reduction should be carried out to prevent complications such as avascular necrosis, heterotopic ossification, and arthritic changes of the joint.¹⁻⁵ Several closed reduction strategies can be used.¹⁻⁵ Failed closed reduction necessitates an urgent surgery to relocate the femoral head within six hours of injury.

CASE REPORT

An obese 17-year-old man who had allegedly been in a car accident arrived at the emergency room with a right thigh pain and deformity. Clinical examination revealed a pale and pulseless right leg with non-palpable dorsalis pedis, posterior tibial, popliteal and faint femoral arteries pulses. However, sensation over the femoral and sciatic nerve distribution were intact. A handheld Doppler scan showed absent signals at dorsalis pedis, posterior tibial and popliteal arteries while femoral artery showed biphasic signal. A right pubic type anterior hip dislocation

with fractured greater trochanter was visible on a plain radiograph (Fig. 1a, b). CTA on the right lower limb discovered the right femoral head was anteriorly displaced and pressing against the nearby right common femoral artery, which reduced the diameter of the vessels beyond the compression (Fig. 1c, d).

At the emergency room, Allis manoeuvre was performed in attempt to reduce the dislocation. Patient lay supine on the bed. Gentle traction and external rotation in hip flexion were performed while the assistant stabilised the pelvis. However, the hip failed to be reduced. The capillary refilling time was reduced to two seconds by periodic vascular assessments, and there was improved colour of the toes, but the pulses were still not detectable. Due to long list of emergency surgery cases taking place, we performed an open reduction and internal fixation on the right hip 12 hours after the injury.

The patient was positioned in a left lateral decubitus position. Hardinge approach is utilized. The muscles surrounding the hip joint were pale and had little contact bleeding during surgery. There was a displaced fracture of the greater trochanter. The femoral head protruded

through a buttonhole defect on the anterior capsule and caught at the superior surface of the superior pubic ramus. A T-shaped capsulotomy was performed, the hip joint was inspected, and the femoral head reduced with axial traction and internal rotation. The greater trochanter fracture was fixed using two 4.5mm cortical screws. Following reduction of the dislocation, there was immediate return of the pulse. The patient was given 5000cc heparin in one-pint normal saline and given oral aspirin 75mg daily for six weeks. In the ward a skin traction was applied to the right leg. Following surgery, a repeated plain radiograph revealed a repositioned femoral head with reduced greater trochanter fracture (Fig. 2a,b).

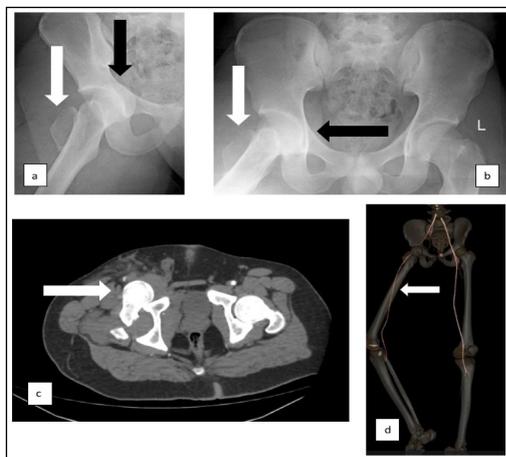


Figure 1: (a) and (b) Admission plain radiograph of the right hip and pelvis. White arrow refers to the greater trochanter fracture. Black arrow points to pubic type anterior right hip dislocation (c) axial cut of CT scan of the pelvis showed anteriorly dislocated right femoral hip that was caught at the superior pubic ramus (white arrow) (d) CTA of the lower limbs that showed compression of the right common femoral artery by the dislocated right femoral head leading to reduced calibre of the distal arteries (white arrow).

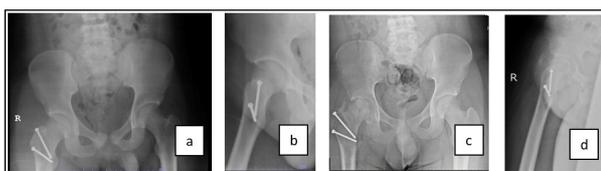


Figure 2: (a) and (b) Immediate post-operative radiograph of the pelvis and right hip. (c) and (d) Plain radiograph at 18 months after injury showed avascular necrosis changes of the femoral head, sclerotic acetabular wall edges and heterotopic ossification along the abductor muscles.

On day nine following surgery, the surgical incision developed purulent discharge and erythema. The white blood cell count was increasing in trend from $26 \times 10^3/\mu\text{L}$ to $32 \times 10^3/\mu\text{L}$. At 1617nmol/L , the C-reactive protein also increased. Right thigh wound debridement and Collatamp® insertion then followed. At the site of the incision, there was a pus collection seen. Seropurulent discharge was seen inside the hip joint underneath friable joint capsule. Enterobacter species were grown in

intraoperative tissue cultures. Throughout admission, the patient received gentamicin and cefuroxime intravenously for seven and five days, respectively. Against medical advice, the patient was discharged from the hospital with oral antibiotics on day 14 following surgery.

Six weeks after the first surgery, there was a small sinus at the centre of the wound discharging minimal hemerosous collection. Six weeks later, plain radiograph revealed a united right femur greater trochanter fracture, reduced femoral head with no obvious avascular necrosis of the femoral head and osteomyelitis changes. The C-reactive protein decreased to 200nmol/L . On his latest follow-up 18 months after the trauma the plain pelvis radiograph showed aspherical femoral head, sclerotic acetabular edges consistent with avascular necrosis and degenerative changes of the acetabular wall. Heterotopic ossification was also seen along the abductor muscle fibers (Fig. c,d). The patient complained of right hip pain and was able to walk unaided with a limping gait. Clinically there was healed sinus at the centre of the surgical scar (Fig. 3a). Limited active and passive range of motion was observed more marked on internal and external rotation. Assessment of the passive range of movement showed right hip flexion of 0-45, abduction 0-45 and adduction 0-15 (Fig. 3b,c,d). Due to the young age, we advised the patient for total hip arthroplasty in the future if pain becomes not tolerable and developed limited hip range of motion.



Figure 3: (a) On follow up there was a sinus formation at the centre of the surgical scar. The range of motion was grossly restricted. Flexion was from 0-45 degrees (b), while abduction was at 0-30 degrees (c). (d) The right lower limb attitude was in external rotation.

DISCUSSION

Hip dislocation can be divided into congenital and acquired.¹ Acquired cases can be further classified into native dislocation or dislocations that occur after total hip arthroplasty procedure.¹ A native dislocation typically

happens following motor vehicle accident and can be divided into posterior and anterior dislocation.¹

Anterior dislocation is not as common as the posterior type, approximately 10-15% of all dislocations.¹⁻⁵ The reason is possibly due to the mechanism of injury to produce an anteriorly dislocated hip being rarer.^{2,3} The direction of the anteriorly dislocated hip is either superior-anterior (pubic) or inferior-anterior (obturator).^{2,3} Superior-anterior dislocation is infrequent and usually resulted from extreme abduction, extension and external rotation force.^{2,3}

Immediate recognition of this injury is important to prevent complications.¹ A thorough assessment of the patient via primary survey should be performed as per protocol to avoid missing life-threatening injuries.^{1,4} As for local limb assessment, the position of the anteriorly dislocated hip is positioned in the abduction and external rotation.¹⁻⁵ The deformity would also depend on the types of dislocation, a superior-anterior type would produce a flexion deformity while inferior-anterior type would have an extended hip.^{1,2} Detailed assessment of the ipsilateral limb is also crucial to identify neurovascular damage.^{1,3} Furthermore, ipsilateral bone or soft tissue injuries could potentially lead to difficulty in joint reduction and exacerbates the initial injury.¹

Immediate reduction of the dislocated femoral head within six hours is paramount to prevent complications.^{1,3,5} A traumatic hip dislocation is commonly associated with concurrent ipsilateral fractures of the femoral head, femoral neck and acetabulum.¹⁻⁸ Avascular necrosis is one of the complications and may eventually lead to post-traumatic osteoarthritis in the future.¹⁻⁷ The incidence of avascular necrosis could be significantly reduced if the reduction is performed within six hours after injury.^{1,3} Although no functional impairment was reported, heterotopic ossification may potentially occur as a result of the production of bone in the soft tissues around the affected area.¹⁻⁵ For anterior hip dislocation, associated injury to neurovascular structures is rarely mentioned.¹ Only a few cases of anterior hip dislocation with concurrent ipsilateral femoral neck,

femoral head, and intertrochanteric fractures, as well as acetabular wall and pubic rami, were discussed.²⁻⁹ Anterior hip dislocation is a high-velocity injury that frequently co-occurs with injuries to other systems, including contralateral long bone fractures, cerebral hemorrhage, and intraabdominal injuries.⁵

The first imaging technique used to establish the clinical diagnosis and rule out related fractures is a plain radiograph. Typically, an anteroposterior pelvic radiograph suffices.¹⁻⁸ The femoral head that has been anteriorly dislocated typically seems greater in size, and the type of dislocation depends on how close it is to the pubic bone or the obturator canal.¹ Frog leg, Judet, or lateral views of the hip can be used to corroborate any unconfirmed findings.¹ The related fractures shown on the plain radiographs are confirmed and studied using a CT scan after the diagnosis has been made.¹⁻¹⁰ Since there were signs of vascular compromise in our instance, CT angiography was also done to rule out vessel tears or occlusion.

Various closed reduction techniques such as Allis maneuver, Bigelow maneuver, Leftkowitz maneuver, Captain Morgan technique, East Baltimore Lift technique, Skoff maneuver, Howard maneuver and piggy back technique had been described.¹ In our case we attempted Allis maneuver twice before surgery, once at the emergency department and after the patient had been induced under general anesthesia. We also performed Skoff maneuver after putting the patient in lateral position prior to open reduction. These techniques were chosen as the physicians are more familiar with them. Allis procedure is performed while the patient was on the floor. An assistant would stabilize the pelvis. The physician would flex the hip at 90 degrees and give ipsilateral traction with gentle extension and external rotation of the hip.¹ Skoff procedure is performed in lateral decubitus position while the affected leg is facing up with the hip and the knee is placed in 90 degrees flexion. Gentle traction is applied with internal rotation and adduction while one assistant would try to push the palpable femoral head to reduce it back into the acetabulum.¹ As for our patient, we were unable to

achieve reduction of the femoral head possibly due to the head being 'locked' at the superior pubic rami, the 'button-hole' effect of the head through the capsule.

Hip joint can be reached either around an intact gluteus medius tendon (medial, anterior, anterolateral or posterior approach) or through gluteus medius tendon (through the tendon or through the bone).^{11,12} Since the hip was anteriorly dislocated and involved ipsilateral greater trochanter fracture, author decided to avoid violation of the posterior and medial soft tissues by using lateral (Hardinge) approach. After skin incision and subcutaneous incision the gluteus maximus and tensor fascia lata was cut exposing the vastus lateralis and gluteus medius.^{11,12} The gluteus medius is split at the junction of middle and posterior thirds exposing the fractured greater trochanter, the torn capsule and anteriorly dislocated femoral head trapped at the superior pubic ramus.^{11,12}

CONCLUSION

Anterior hip dislocation is an orthopaedic emergency. While posterior hip dislocation is more common, a pubic-type anteriorly dislocated hip with concomitant greater trochanter compressing the adjacent femoral artery is rarer and has never been reported. A head protrusion through a buttonhole defect at the capsule may be the cause of a failed CMR in a hip anteriorly displaced of the pubic type. The femoral head could as well possibly be caught at the superior surface of the ipsilateral superior pubic ramus. Thus, the release of the capsule and the use of a skid are recommended to relocate the femoral head. As early as six months after the incident, our patient already showed signs of complications such avascular necrosis, arthritic changes in the hip joint, as well as heterotopic ossification. In our case septic arthritis of the hip might contribute to the complications. To avoid consequences like those we experienced, we advise immediate surgery for patients with unsuccessful closed manipulative reduction.

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