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CASE REPORT

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Bilateral asymmetric hip dislocation: case report and literature review

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Abstract Simultaneous anterior and posterior hip dislocation is an unusual injury. A unique case is presented, consisting of bilateral asymmetric hip dislocation with associated femoral head, femoral shaft, and acetabular fractures resulting from a motorcycle collision. The mechanisms of injury, management, role of imaging, and complications of this injury complex are discussed, with a review of the relevant literature.

Keywords Posterior hip dislocation · Anterior hip dislocation · Asymmetric hip dislocation · Hip trauma · Hip fracture

Introduction

Traumatic hip dislocation is a severe injury with the potential for significant complications and long-term patient morbidity. Bilateral hip dislocation is a rare injury, especially when it is asymmetric. Associated fractures are common and can complicate management. Prompt reduction and early definitive surgical therapy are essential to proper treatment of these injuries. The case presented herein illustrates the fracture patterns associated with both anterior and posterior hip dislocations and the importance of imaging in the management of these injuries.

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Case report

A 24-year-old man was brought to the emergency room after his motorcycle collided at high speed with a tree. At initial evaluation, the patient was intubated with a Glascow Coma Scale score of 3, but his mental status improved while he was in the emergency department. Multiple extremity abrasions were present, and an obvious varus deformity of the right thigh was noted. The pelvis felt stable to compression. Lower extremity pulses were intact. Weakness was noted in the peroneal nerve distribution in the left lower extremity. The right lower extremity was neurologically intact.

Radiographs (Fig. 1) obtained in the trauma bay revealed an anterior–inferior dislocation of the right hip. A transverse fracture of the right proximal femoral shaft was present with approximately 75° angulation with the apex laterally. An impaction fracture of the right femoral head was also present. A posterior–superior dislocation of the left hip was present with an associated severely comminuted fracture of the left acetabulum. Preoperative CT was performed (Fig. 2), revealing a comminuted posterior wall acetabular fracture with combined transverse acetabular fracture on the left.

The patient was taken to the operating room within 3 h of the injury, where closed reduction of the left hip dislocation was performed. Closed reduction of the right hip dislocation was then performed, and the right lower extremity was placed in traction. Open reduction and internal fixation of the right femoral shaft fracture was performed with placement of a statically locked anterograde intramedullary rod. A traction pin was placed in the left tibia, and the left lower extremity was left in traction.

Postreduction radiographs (not shown) showed satisfactory reduction of the hip dislocations and again demonstrated the above-described fractures. A postoperative CT (Fig. 3) revealed a comminuted left posterior wall acetabular fracture with retained intra-articular fragments.

The patient was taken back to the operating room on postinjury day 4 for open reduction and internal fixation of the left acetabular fracture, initially using a posterior Kocher–Langenbeck approach. Through the posterior approach, several fracture fragments were removed from the joint. The sciatic nerve was noted to be flattened at the sciatic notch and slightly contused. Due to difficulty with reduction of the posterior column and residual displacement of the transverse component of the fracture anteriorly, an iliac fossa approach was performed, dissecting under the iliacus muscle on the inner table of the pelvis. The anterior column fracture was reduced, and a 3.5 mm screw was placed through the ilium under fluoroscopic guidance, thus stabilizing the anterior column. The posterior column was provisionally fixed with a five-hole 3.5-mm pelvic reconstruction plate. The intra-articular fragments were removed,

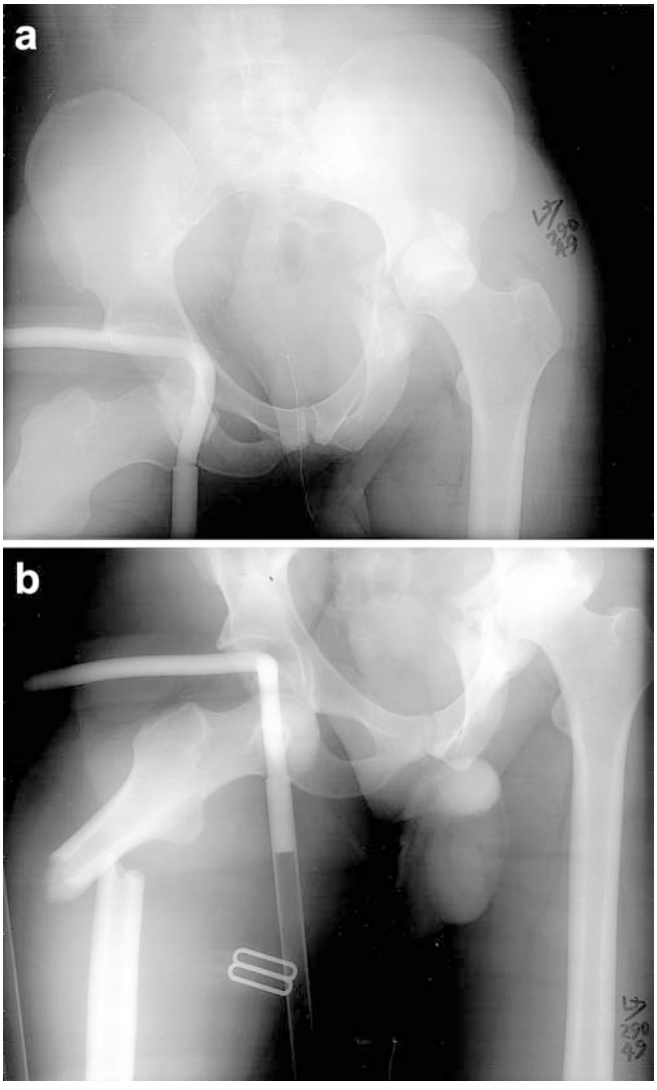

Fig. 1 a AP radiograph of the pelvis demonstrates a right posterior hip dislocation with an associated right femoral head fracture and a left posterior hip dislocation with comminuted acetabular fracture. **b** AP radiograph of both hips shows the above-described injuries and reveals a displaced proximal right femoral shaft fracture

and articular reduction was directly visualized. Lag screws were used to secure the reduction. A nine-hole 3.5-mm pelvic reconstruction plate was placed as a buttress over the posterior wall and was affixed with three screws proximally in the ilium and three screws distally in the ischium. Postoperative radiograph and CT (not shown) demonstrated near-anatomic alignment of the left acetabulum without intra-articular fracture fragments.

Initial postoperative management included slide transfers, bilateral lower extremity non-weight-bearing, and posterior hip dislocation precautions on the left with a sitting restriction at 60° hip flexion. Lovenox (enoxaparin sodium) was administered beginning on postoperative day 1 after the initial surgery and was resumed on postoperative day 1 after the definitive surgery. After the second operation, the patient had respiratory distress, which resolved over a few days. The patient was scheduled for prophylactic radiation based on surgeon preference for the prevention of heterotopic ossification. However, the patient's postoperative respiratory status prevented this from being performed. The remainder of his postoperative course was unremarkable, and he was transferred to a rehabilitation facility.

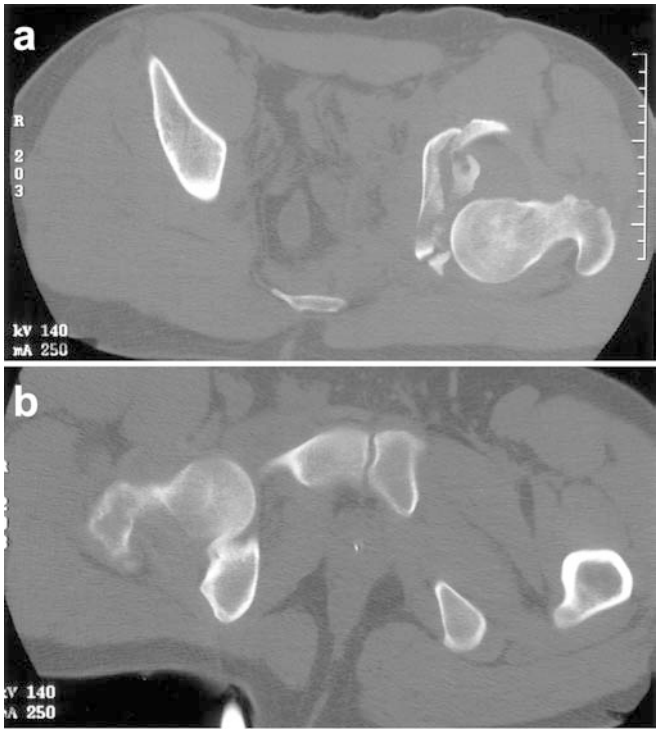

Fig. 2 a Axial CT image through the hips shows the left posterior hip dislocation, comminuted left acetabular fracture, and left hip joint effusion. **b** Axial CT image demonstrates the right anterior hip dislocation with joint effusion

Fig. 3a, b Axial CT images through the hips show relocation of both femoral heads (**a**, **b**), impaction fracture of the right femoral head (**a**), and comminuted left acetabular fracture with multiple intra-articular fragments (**a**, **b**)

Discussion

Dislocation of the hip accounts for approximately 5% of all joint dislocations [1, 2], classically occurring in young male patients. Asymmetric bilateral hip dislocation is a rare injury pattern, with only 14 cases reported in the English-language literature [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14].

Hip dislocations result from high-energy traumas, most commonly related to automobile collisions. The direction of the dislocation depends upon how the forces are applied. For bilateral asymmetric hip dislocation to occur, forces must be applied in two different directions simultaneously, which results in one hip dislocating posteriorly and one anteriorly [1, 2].

Posterior hip dislocations are the most common type, representing more than 85% of all hip dislocations. Posterior dislocation usually occurs in patients involved in road traffic accidents resulting in a severe deceleration force which is applied to the flexed knee. Posterior wall acetabular fractures frequently occur in association with posterior dislocations [15]. Associated knee injuries are also common, including fractures of the patella [16].

Anterior hip dislocations are less common than posterior dislocations, representing approximately 11% of all hip dislocations. Anterior dislocations are usually inferior, but superior dislocations also occur. Anterior–inferior dislocations result when the hip is forced into abduction and external rotation [15]. Fractures of the acetabulum are uncommonly associated with anterior–inferior hip dislocations, but impaction fractures of the femoral head are often present [17]. Central dislocation represents a fracture of the acetabulum with protrusion of the hip into the pelvis [15]. Fractures of the femoral shaft may also occur in association with hip dislocations [18, 19].

Hip dislocations are often clinically evident by limb position. With posterior dislocations, the lower extremity is typically shortened, internally rotated, and adducted. The lower extremity is typically flexed, abducted, and externally rotated with anterior–inferior dislocations [1, 15, 20].

Screening pelvic radiographs in the multiple-trauma patient and in patients with clinical findings of hip dislocation should be performed in the initial evaluation. Judet views are useful for identifying associated acetabular fractures, as acetabular fracture fragments may interfere with reduction or result in nonconcentric reduction. Posterior hip dislocation may initially go unrecognized in the setting of acetabular fractures, particularly with transverse and T-type fractures. Judet or lateral views may allow early recognition and treatment of the dislocation in this setting, as acetabular reconstruction may be delayed [17, 21]. In patients with uncomplicated dislocations, clinical evaluation and standard radiographs may constitute a satisfactory evaluation [22].

CT is usually not necessary prior to reduction, as it delays reduction and is frequently unnecessary for initial management. CT is initially useful when closed reduction fails due to a mechanical block, and in patients with multiple injuries in whom Judet views may be technically difficult. CT does play an important role in the planning of definitive surgical therapy for complex acetabular fractures, the evaluation for intra-articular osteochondral fragments, and in the assessment of pelvic hematomas. Typically, 5-mm sections are performed through the pelvis with 2- or 3-mm thin sections through the hip joints. Coronal, sagittal, and 3D reconstructions can also be performed for further characterization [17, 20, 21, 23, 24].

Early diagnosis and reduction of hip dislocations is essential, as the risk of osteonecrosis of the femoral head may be affected by the time elapsed prior to reduction of the hip. The current recommendations are for reduction of hip dislocation within 6 h [19, 20, 22, 25, 26]. Osteonecrosis has been reported in 6–27% of patients after hip dislocation [17, 27] and can occur up to 2 years after injury. In one series, osteonecrosis occurred in 5% of hip dislocations reduced within 6 h, in 8% of hips reduced after 6–24 h, and in 16% of hips reduced on the 2nd and 3rd days. Osteonecrosis has been reported to occur in 7.5% of posterior hip dislocations, 1.5% of anterior dislocations, and 1.6% of central dislocations [28]. The most common presenting symptom is pain. Standard hip radiographs are often normal in the early stages, and MRI or radionuclide bone scans can be performed to evaluate for osteonecrosis in the earliest stages. In advanced stages, femoral head collapse and associated degenerative changes develop, which can result in significant morbidity for the patient [25].

Post-traumatic arthritis is a frequent complication of hip dislocation, reported to occur in 16% of uncomplicated hip dislocations and in up to 88% of patients with severe acetabular fractures [29, 30, 31]. Factors cited in the development of post-traumatic arthritis after hip dislocation include femoral head fractures (transchondral or impaction fractures), acetabular fractures, nonconcentric reduction, time delay between injury and reduction, and osteonecrosis [31].

Neurovascular injuries may accompany hip dislocations. Injury to the femoral neurovascular bundle rarely occur as a result of anterior dislocations [15, 32]. The sciatic nerve is the most commonly injured nerve, and sciatic nerve injuries have been reported in 10% of adults after posterior hip dislocation. The peroneal branch is most often affected. Clinical evaluation for nerve injuries is often difficult due to concomitant injuries. Symptoms include pain, paresthesias, sensory loss, or weakness in the injured nerve distribution. Nerve compression may be initially related to the dislocated femoral head or displaced fracture fragments, and later it may be related to scar formation or heterotopic ossification. Reduction of the femoral head and displaced fracture fragments is important in treatment, as is early

rehabilitation. Approximately 60–70% of patients with sciatic nerve injury will have at least a partial recovery of function [33].

Heterotopic ossification is another important complication of hip dislocations and pelvic fractures. Prophylactic radiation can be used in an attempt to decrease heterotopic ossification, typically administered as a one-time dose of 700 cGy within 48 h of definitive surgery. Indomethacin (25 mg p.o. three times a day for 6 weeks) has also been reported to be useful in the prevention of heterotopic ossification [34, 35].

Conclusion

The case presented represents an unusual, severe combination of injuries resulting from a high-speed motorcycle accident. It raises important issues related to the evaluation and management of traumatic hip dislocations. Traumatic hip dislocation represents a true orthopedic emergency. Given the severity of the associated complications, and the young age of the population affected, every effort should be made to ensure prompt diagnosis and therapy.

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