

## Acute Osteochondral Injuries of the Hip

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**Acute osteochondral injuries of the hip are rare in the absence of associated dislocation. A series of cases is presented in which these injuries were sustained after relatively minor trauma to the hip. Radiologic studies revealed evidence of mild hip dysplasia and, in one case, an osteochondral fracture of the right femoral head. Scintigraphy revealed the fracture and unexpected uptake in the acetabulum, which was subsequently confirmed as being due to labral tears or acetabular osteochondral injuries. In addition, the scan showed evidence of a possible avulsion-type injury of the iliofemoral ligament, suggesting the mechanism of subluxation.**

**Key Words: Acetabular Labrum, Hip Dysplasia, Osteochondral Injury.**

**A**CUTE OSTEOCHONDRAL INJURIES are invariably caused by shearing, rotational, or tangentially aligned impaction forces that result in abnormal joint motion (1). Either one or both articular surfaces may be damaged, with the fragments being displaced in high-grade injuries. The most common sites of such injury are the shoulder, patella, lateral femoral condyle, and talar dome (1).

Reports of this type of injury in the femoral head are usually in the context of hip dislocation (1-3). The site of the injury in the femoral head depends on whether the dislocation is anterior or posterior (2). We present three cases of acute osteochondral injury of the hip that occurred after relatively trivial trauma, with no dislocation of the hip. Mild hip dysplasia was present, suggesting that the hip may have experienced brief subluxation, with the injury occurring on relocation. The three cases include a variety of complications of such a hip injury, affecting both the acetabular component and the femoral head.

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### Case Reports

#### Case 1

A 28-year-old previously well man experienced sharp pain in the right groin after tripping while walking. The pain persisted in the medial aspect of the right groin for several months before he sought medical advice. At examination he was 185 cm tall and weighed 97 kg. Examination of the right hip revealed some painful limitation of movement at extreme flexion and adduction. Findings of a neurologic examination were normal, as was his gait. Plain radiography (Fig. 1) confirmed a flattened area on the superior weight-bearing portion of the femoral head, an acetabular angle of 46°, and a slightly valgus femoral neck. This was thought to represent mild hip dysplasia, with the possibility of an injury to the femoral head. A computed tomographic (CT) scan suggested a possible osteochondral injury of the femoral head and also showed irregularity in the anterior aspect of the acetabulum, indicative of an avulsion fracture. The scintigraphic study showed increased uptake in the acetabulum, femoral head, and in the distribution of the distal attachment of the iliofemoral ligament (Fig. 2). These changes were thought to represent an osteochondral injury to the femoral head, acetabular labral tear, and an avulsion-type injury to the iliofemoral ligament, possibly related to an episode of subluxation of the hip. Magnetic resonance imaging (MRI) confirmed the osteochondral injury of the femoral head and marrow edema (Fig. 3). The changes of an acetabular labral tear were also noted. The patient refused therapy and was not followed further.

#### Case 2

A previously well 34-year-old woman fell onto her abducted left leg and experienced a sharp pain in the left

Received for publication February 13, 2002. Accepted April 15, 2002.

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DOI: 10.1097/01.RLU.0000020716.49391.26

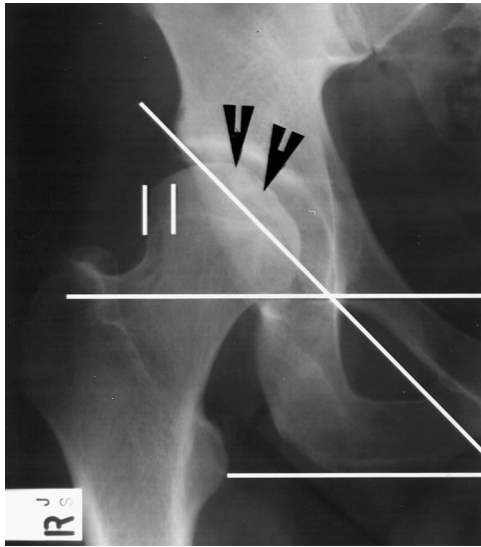


Fig. 1. A plain radiograph from case 1 shows features of hip dysplasia with an acetabular angle of  $46^\circ$ , a valgus femoral neck, and substantial loss of coverage of the femoral head. A flattened area is also evident (arrowheads) on the superior aspect of the femoral head.

groin radiating to the buttock. Examination revealed painful limitation of adduction and flexion of the left hip. Findings of a neurologic examination were normal, as was her gait. The plain film was reported as consistent with mild left hip dysplasia, with an acetabular angle of  $46^\circ$  and a valgus femoral neck. Scintigraphy showed increased uptake in the anterior acetabulum, thought to be consistent with an acetabular tear and uptake at the sites of attachment of the iliofemoral ligament (Fig. 4). This was thought to be consistent with an episode of subluxation of the hip with an iliofemoral ligament avulsion-type injury and a torn acetabular labrum. The torn acetabular labrum was confirmed on arthroscopy of the

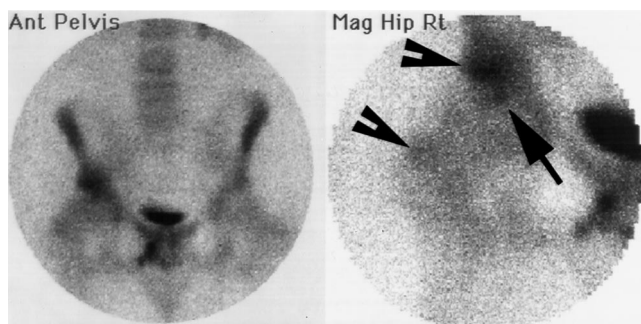


Fig. 2. On a bone scan from case 1, the delayed study shows intense uptake in the superior acetabulum and focal uptake in the femoral head (arrow) and along the attachments of the iliofemoral ligament (arrowheads).

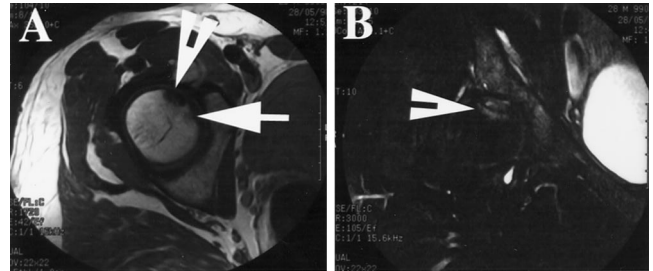


Fig. 3. (A) An MRI scan from case 1 shows a large osteochondral defect in the right femoral head (arrowhead), with the fovea capitis lying more medially (arrow). (B) Bone marrow edema (arrowhead) is apparent in the fat-suppressed image. Note also the high signal changes in the acetabulum.

hip, when the torn portion was resected. The patient did well after operation and had only mild symptoms of hip discomfort.

### Case 3

A 45-year-old previously well man felt a sharp pain in the left groin while swimming. This occurred as he turned vigorously at the end of a lap, with an abducted left leg. Pain persisted unabated for several weeks before he sought medical advice. Findings of an examination were unremarkable other than painful limitation of adduction and flexion of the left hip. Results of a neurologic examination were normal, as was his gait. Plain radiography was described as showing mild hip dysplasia, with an acetabular angle of  $45^\circ$  and a valgus femoral neck. Scintigraphy showed hyperemia and intense uptake in the left acetabulum, thought to be an acetabular labral tear. An uptake pattern thought to be consistent with an iliofemoral ligament avulsion-type injury was also noted (Fig. 5). Arthroscopy of the hip confirmed an extensive acetabular labral tear and an osteochondral fracture of the acetabulum. The labral tear was sutured and the fragment of the fracture excised. The patient continues to have intermittent pain of lesser severity in the left hip.

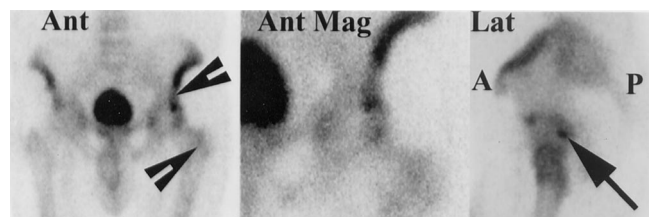


Fig. 4. On a bone scan from case 2, delayed images show intense uptake in the left acetabulum and increased uptake at the insertions of the iliofemoral ligament (arrowheads). The acetabular changes (arrow) are particularly evident in the lateral image.

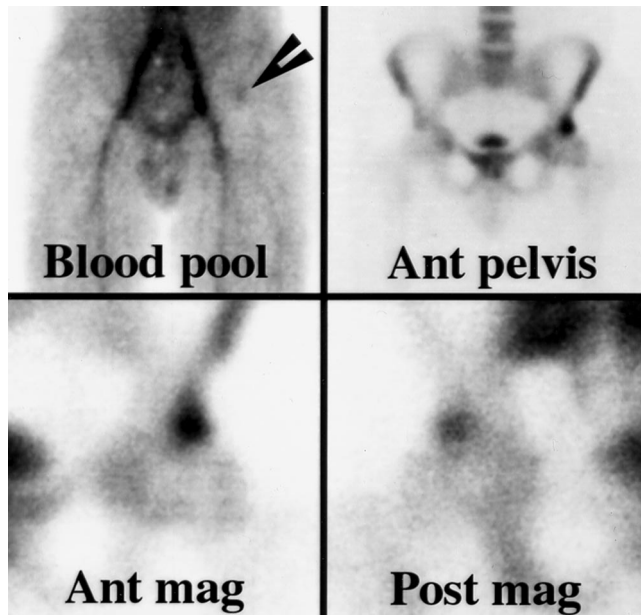


Fig. 5. On a bone scan from case 3, the blood-pool image shows intense hyperemia in the superior aspect of the left acetabulum (arrowhead). Delayed images show intense uptake in the superior acetabulum, with milder changes at the distal attachment of the iliofemoral ligament into the superior aspect of the femoral neck.

### Discussion

These cases illustrate several problems in interpreting images of such injuries of the hip. Initial radiologic and CT reports suggested the possible presence of significant abnormalities, which were subsequently recognized in retrospect. The extant literature indicates that such injuries are commonly missed on plain radiographs (4,5) and may appear as flattening of the femoral head on CT, which may be easily overlooked (2).

Full appreciation of the extent of the injury was provided by the scintigraphic studies and confirmed by the MRI scan in case 1. Additional evidence present in the scintigraphic study and partly confirmed in the CT and MRI studies suggests a mechanism for the injury.

Scintigraphy revealed increased uptake in the antero-superior lip of the acetabulum, raising the possibility of an associated acetabular injury or fracture. The CT scan confirmed this, and the MRI showed it to be a labral

tear. Unexpectedly, scintigraphy showed changes suggesting an avulsion-type injury to the iliofemoral ligament (Fig. 2). Synthesis of these findings suggests that the dysplastic acetabulum may have predisposed the femoral head to subluxation anteriorly and superolaterally, with spontaneous relocation of the head. The abnormally steep acetabulum would have failed to contain the femoral head, creating a superior and lateral force vector that would have forced the anteromedial aspect of the femoral head against the labral-acetabular complex, causing damage to one or both structures. However, the movement would have been constrained by the iliofemoral ligament in the anterior direction, producing a strain injury to the ligament.

Although the patient described in case 1 experienced both injuries, the patients in cases 2 and 3 experienced only the acetabular injuries. Scintigraphy can show both patterns of injury and provide information on the mechanism of the injury. Recognition of this type of injury is crucial, because a loose femoral fragment may cause progressive joint damage. An important role of MRI is in staging the degree of displacement of the fragment and determining the subsequent course of treatment. Damage to the articular surface of the joint is one of the most important predisposing factors in the development of post-traumatic osteoarthritis (6).

Several unusual cases of osteochondral injuries of the hip are presented that occurred after relatively trivial trauma, but in the presence of mild hip dysplasia. Scintigraphy suggests that subluxation may be a causative factor in the injury. Correlative imaging provides several clues about the complex nature of the injury.

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