

# CT Detection of Cortical Fracture of the Femoral Head Associated with Posterior Hip Dislocation

Patrice Richardson<sup>1</sup>  
 Jeremy W. R. Young  
 David Porter

Posterior dislocation of the femoral head is a common injury in automobile accidents and is frequently associated with fractures of the posterior acetabular rim. Fractures of the anterior cortex of the femoral head have not been described. One hundred sixty-four cases of posterior hip dislocation presenting consecutively to our shock trauma unit and emergency department during a 3-year period were evaluated with plain film radiology and CT. In 21 cases (13%), CT showed an anterior cortical fracture of the femoral head that could not be seen on plain radiographs. This injury is similar to the Hill-Sachs lesion of the humerus that results from anterior dislocation. The anterior cortical fracture was associated with fractures of the posterior acetabulum in 18 cases (86%). The anterior fracture is caused by impaction of the anterior femoral head against the posterior acetabular rim at the time of dislocation.

We conclude that anterior cortical fracture of the femoral head is a common accompaniment to posterior acetabular dislocation.

*AJR* 155:93-94, July 1990

Fracture of a bone around a joint occurring with dislocation of that bone is a well-recognized association, seen most commonly in the Hill-Sachs lesion, an impacted fracture of the humerus after anterior dislocation. In the hip, an impacted fracture of the femoral head after anterior dislocation also has been reported [1]. An impacted fracture of the anterior cortex of the femoral head occurring during posterior dislocation of the femoral head has not been described. This fracture is not visible on plain radiographs, which explains why this has not been reported before. Our study indicates that this is a common injury however, occurring as a result of impingement of the femoral head on the posterior acetabular rim. This fracture is readily identified on CT, and its CT appearance is described and illustrated in this report.

## Materials and Methods

We retrospectively reviewed 164 consecutive patients with acetabular dislocations and fracture dislocations, seen in our emergency department and shock trauma center during a 3-year period, in whom CT scans were obtained. The patients' charts, surgical reports, and plain radiographs were examined to confirm acetabular dislocation when this was not positively identified at the time of the CT scan. The CT scans were evaluated independently by the authors. A clear indentation or cortical interruption in the anterior aspect of the femoral head on the affected side was regarded as indicating an anterior cortical fracture. Plain films were interpreted without knowledge of the CT appearances. In addition, the contralateral normal hip was evaluated in every case.

## Results

Impacted fractures were seen in 21 (13%) of 164 posterior fracture dislocations (Figs. 1-4). In 69 cases, the femoral head remained dislocated during the initial CT examination, and in one case the femoral head clearly still contained the posterior

Received January 2, 1990; accepted after revision February 21, 1990.

<sup>1</sup> All authors: Department of Diagnostic Radiology, University of Maryland Medical Systems, 22 S. Greene St., Baltimore, MD 21201. Address reprint requests to J. W. R. Young.

0361-803X/90/1551-0093  
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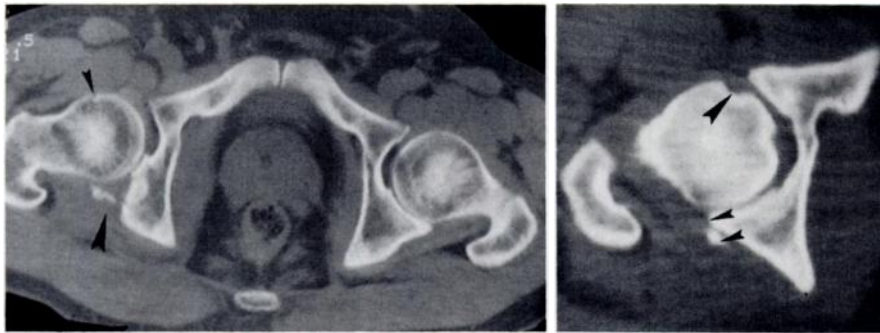


Fig. 1.—CT scan shows postreduction image after posterior dislocation of right hip, as evidenced by disruption of posterior pillar of acetabulum (*large arrowhead*). Note focal defect on anterior cortex of right femoral head (*small arrowhead*). Normal left femoral head shows no similar defect.

Fig. 2.—Postreduction CT scan shows a focal defect on anterior cortex of femoral head (*large arrowhead*) and a small avulsion of posterior rim of acetabulum (*small arrowheads*).



Fig. 3.—CT scan shows diffuse cortical abnormality in anterior aspect of femoral head (*small arrowheads*). Note disruption of posterior acetabular rim resulting from posterior dislocation (*large arrowhead*).

Fig. 4.—CT scan shows posterior dislocation of left femoral head with a fracture of left posterior acetabular pillar. Partial reduction has been obtained, but full reduction is prevented by a fragment of bone arising from posterior acetabular rim that has become embedded in anterior cortex of femoral head.

acetabular fragment lodged within the impacted cortical fracture (Fig. 4). In one case, the dislocation was not noted in the patient's chart at the time of admission, possibly because of the severity of the injuries in this multitrauma patient. This patient had the classic posterior acetabular fracture attributed to the dislocation. In most cases, the fracture was a small (<5 mm) V-shaped infraction of the anterior cortex (17 cases), although a more diffuse defect also was seen (Fig. 3). No impacted fractures were identified on the normal side in any of the patients studied. In addition, the fracture was not seen on plain radiographs in any case. Fracture of the posterior acetabular rim was seen in 18 of the 21 cases in which the anterior cortical fracture of the femoral head was seen. This varied from a minor avulsion of the posterior rim to a major disruption involving the posterior column of the acetabulum.

## Discussion

The most common direction for a dislocation of the femoral head seen today is posterior, usually resulting from impingement of the knee against the dashboard during automobile accidents. Fracture of the posterior portion of the acetabulum is a frequent accompaniment to this type of injury and has been shown by Judet et al. [2] to result from posteriorly directed forces transmitted through the femur. Slice fractures of the femoral head, in which a portion of the acetabular bone and cartilage is sheared off and left as a free fragment during posterior dislocation, also have been described [3].

Cortical infractions are well-recognized sequelae to joint dislocations and are most commonly recognized at the shoulder. The Hill-Sachs lesion is an infraction of the posterior/superior cortex of the humeral head from impingement on the inferior rim of the glenoid cavity after anterior dislocation of the shoulder. In the hip, a cortical fracture of the posterior

aspect of the femoral head also has been reported in association with anterior dislocations of the femoral head [1]. However, we have found no report of a similar fracture of the anterior femoral head from posterior dislocations. The reason that this fracture has not been reported before is most likely that the lesion is not visible on plain radiographs and, when visible on CT, is a minor finding compared with the posterior dislocation of the femoral head and disruption of the posterior acetabular rim, which occurred in the majority of our cases (Figs. 1–4).

The mechanism of this injury is thought to be forceful impingement of the anterior aspect of the femoral head on the posterior acetabular rim during fracture/dislocations of the femoral head, much as occurs in Hill-Sachs lesions of the shoulder. In our series, this type of injury occurred in automobile accidents, with the knee forcefully jammed against the dashboard of the car with the hip flexed. This gives rise to posterior dislocation of the femoral head, allowing impaction of the posterior rim of the acetabulum against the anterior cortex of the femoral head, and is best illustrated by the case in which the acetabular rim fragment remains in place in the femoral head with the appearance similar to a hatchet blade buried in a log (Fig. 4).

We conclude that a cortical fracture of the femoral head, equivalent to the Hill-Sachs lesion of the humeral head, is a common sequela to posterior dislocation of the femoral head.

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