

# Femoral head fracture in an adult patient with isolated posterior labrum avulsion recognized through the ‘fleck’ sign: technical tips

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## ABSTRACT

Femoral head fractures in adults are known to be frequently associated with femoral neck fractures, acetabular fractures and sciatic nerve neuropathia. Here, we report for the first time in the English medical literature the case of a 30-year-old patient having a Pipkin Type II comminuted femoral head fracture associated to an isolated acetabular labral osteochondral avulsion. This entity was diagnosed preoperatively through the presence of the acetabular ‘fleck’ sign recently described in adolescents with hip dislocation. This was of paramount importance knowing the key role of the acetabular labrum in physiological hip functioning. Therefore, a high index of suspicion of complete posterior acetabular labrum avulsion should be raised in front of a hip computed tomography scan showing the acetabular fleck sign even in an adult patient. This finding is important in posing the surgical indication and in completing the preoperative surgical planning in cases of femoral head fractures and dislocations.

## INTRODUCTION

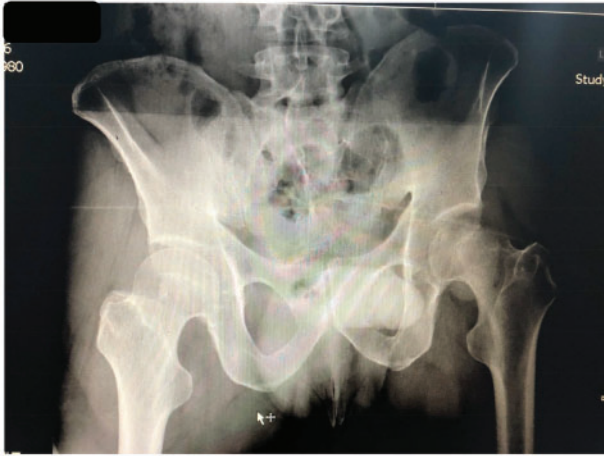
Fracture of the femoral head was first reported by Birkett in 1869 and classified by Pipkin in 1957 [1, 2]. It represents a severe injury to the hip joint usually associated to a high-energy trauma, such as motor vehicle accidents or falls from heights [3, 4]. This entity is rare as only around 5–15% of posterior hip dislocations are associated to femoral head fractures [3, 5]. However, the vast majority of femoral head fractures present with posterior hip dislocation [6]. The incidence of this injury increased in these recent years due to improved resuscitation, which led to increased survival of the severely injured patients [3]. As poor functional outcomes were associated with conservative treatment of femoral head fractures, surgical treatment indications became wider [3, 7, 8]. Femoral head fractures are known to be frequently associated with femoral neck fractures, acetabular fractures, sciatic nerve neuropathia and knee ligamentous lesions as per the mechanism of the initial injury [5, 9, 10]. However, we report here the first case in the available English medical literature of a concentric

comminuted femoral head fracture associated to an isolated subtle hip labrum avulsion in an adult patient, recognized through the recently described acetabular ‘fleck’ sign.

## CASE REPORT

We report the case of a 30-year-old previously healthy patient brought to the emergency department following a fall from a 9-m height with a reception on the left side of his body. After an initial resuscitation was performed and as the patient became haemodynamically stable, he complained only of a severe left hip. Pelvis X-ray shows a left femoral head fracture without hip dislocation (Fig. 1). The remaining explorations performed in the emergency department returned negative. The neurovascular exam of the left lower extremity was normal, and the patient was capable of performing dorsal and plantar flexion of the left ankle. The left hip computed tomography (CT) scan showed three fragments comminuted left femoral head fracture with one fragment being posteriorly dislocated (Fig. 2). There were neither left femoral neck nor left

acetabular fractures, but an acetabular fleck sign was noted on axial and sagittal views (Fig. 3). The patient was transferred to the operating room in the 6 h following his accident to perform an open reduction and internal fixation of his femoral head fracture.

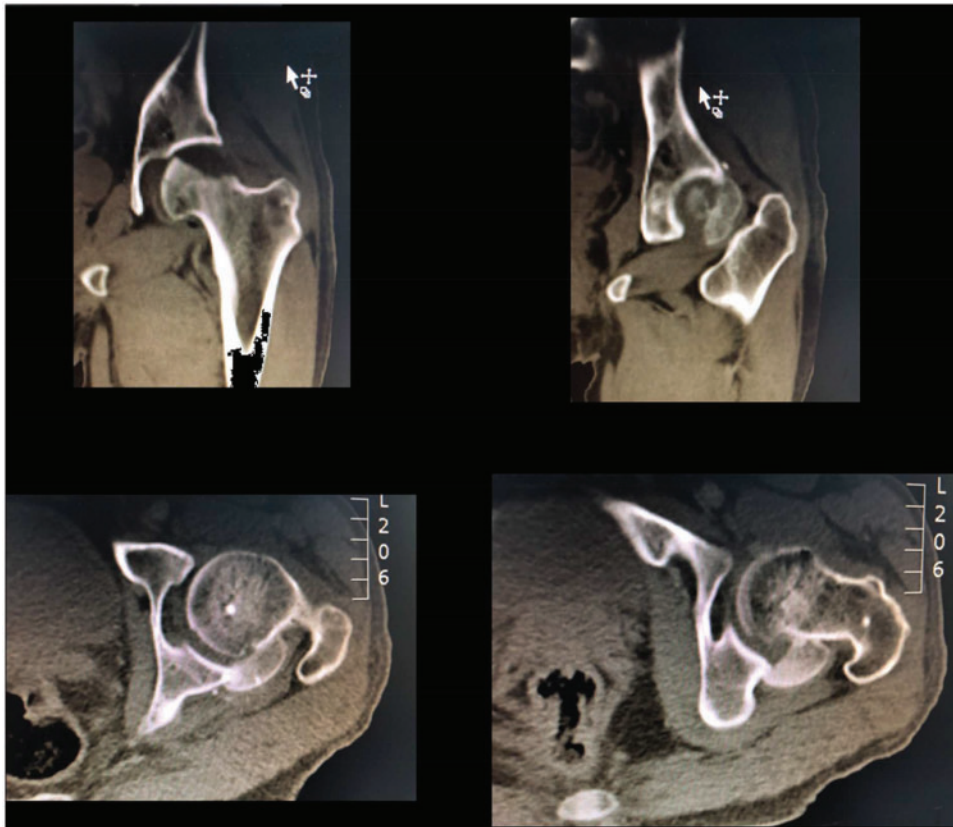


**Fig. 1.** Anteroposterior pelvis X-ray of the patient showing left femoral head fracture without hip dislocation.

### Surgery

Under epidural anaesthesia, the patient was put on a right decubitus position. A Kocher–Langenbeck approach to his left hip was performed. After identification of the femoral neck, the femoral head, the acetabulum and the posteriorly dislocated femoral head fragment, a trochanteric osteotomy was made to widen the exposure. The posterior labrum was found to be completely avulsed posteriorly from 6 to 12 o'clock. This avulsion was associated in its most posterior part to a thick bony rim coming from the posterior acetabular wall (Fig. 4). The dislocated femoral head fragment was reduced and indirect manipulation of the lower left extremity led to a good reduction of the fracture without the need for hip dislocation. This was certified by peroperative X-ray control. The reduced fragments were therefore fixed with three cannulated Barouk screws inserted under X-ray guidance.

The avulsed acetabular labrum with its posterior bony rim was reduced and fixed anteriorly by two pins and posteriorly by a spring plate and screws to the posterior wall of the acetabulum. Mobilization under anaesthesia confirms hip stability. After thorough washing and haemostasis, the wound was closed over an aspirative drain.



**Fig. 2.** Frontal and axial cuts of the left hip CT scan showing left femoral head fracture with posterior dislocation of a fragment.

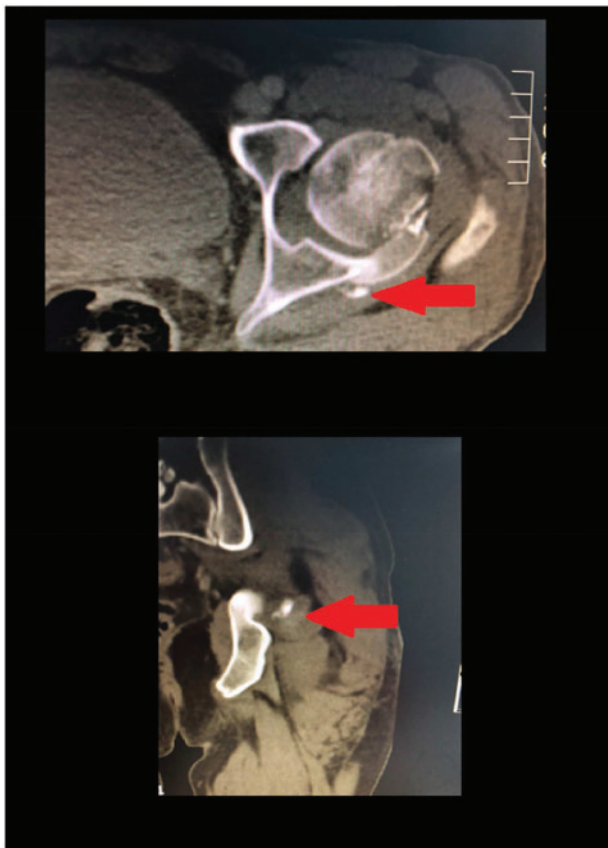
### Postoperative course

Postoperative X-rays show good reduction. Hip mobilization without weight bearing was allowed in the postoperative course that went smooth without notable complications. The patient was discharged 2 days following the surgery. At 6 weeks follow-up the patient began partial weight bearing. The radiographs at 6 weeks show a preservation of the good reduction (Fig. 5).

### DISCUSSION

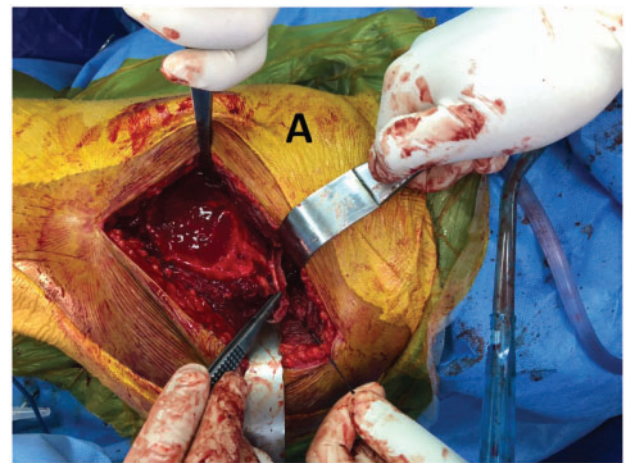
Surgical intervention is indicated for this young adult patient presenting to the emergency department immediately after a fall from a 9-m height with a Pipkin Type II comminuted fracture dislocation of the femoral head [9]. Surgery should be done in the shortest delays as soon as the patient is medically and haemodynamically stable to reduce the risk of associated subsequent avascular necrosis of the femoral head [5]. Surgery in this specific case is associated to a better functional outcome on follow-ups [3].

What characterizes this case is the presence, on the preoperative CT scan of the left hip of the acetabular fleck



**Fig. 3.** Axial and frontal cuts of the left hip CT scan. The arrow shows the fleck sign.

sign, in the absence of an obvious acetabular fracture. The acetabular fleck sign was described for the first time in 2016 by Blanchard *et al.* [11] and was defined as a small osteochondral avulsion of the posterior labrum. It can be identified on the CT scan though this exam can underestimate the size of the detached fragment [11]. This sign, when identified, was consistently associated to a complete detachment of the posterior labrum from the acetabulum [11]. Identifying the fleck sign indicative of labral tear is of paramount importance in considering indications for surgery as well as in surgical planning [11]. Biomechanical studies confirmed the importance of the labrum in the physiological function of the hip as it plays a significant role in stability and transfer of loads across the hip joint [12, 13]. Furthermore, an intact labrum provides resistance to lateral translation of the femoral head within the acetabular cup [14]. Also, a diseased labrum has altered sealing capacity leading to abnormal fluid circulation within the hip joint causing pathologic changes to the hip with time [15]. All this evidence underlines the importance of diagnosing this entity and keeping a high index of suspicion for labral tears associated to femoral head fractures and dislocation [11]. This is of extreme importance when the femoral head fracture is undisplaced or when concentric reduction is obtained with closed means as surgical intervention for labral tear repair in these cases seems a good choice even if femoral head fracture does not warrant by itself an internal fixation [11]. Labral avulsion repair can be performed by suture anchors or pins [11, 16]. Cannulated screws and plates can also be a choice when the size of the bony fragment avulsed is consistent [11]. Good results are



**Fig. 4.** Operative view showing the avulsed labrum: Posterior approach of Kocher–Langenbeck. Head to the right of the photo. Feet to the left of the photo. A, anterior.

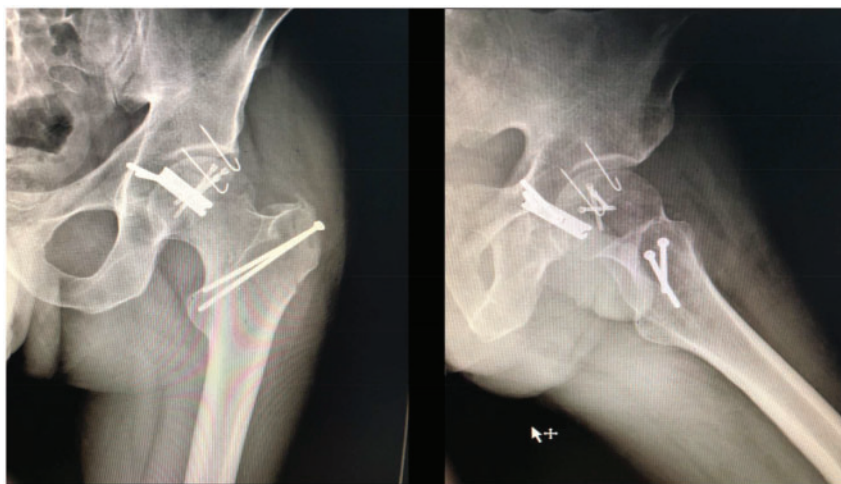


Fig. 5. Left hip A/P + lateral X-rays 6 weeks after the surgery.

expected as a bovine study showed stable healing of a repaired labrum through a fibrovascular scar [17].

The patient was operated on using a posterior approach for its lower risk of heterotopic ossification and also to facilitate the access to the posterior labrum that was planned to be anatomically repaired [4]. A trochanteric digastric osteotomy was performed to widen the exposure and to facilitate anatomic reconstruction. Pins were used where the labrum was detached without a bony rim. A small fragments plate with small fragments screws were used to fix the bony avulsed segment posteriorly.

The fleck sign was first described in a series of adolescents presenting with posterior hip dislocation with or without femoral head fracture [11]. This is the first report in the English literature describing a fleck sign in an adult patient, with surgical findings similar to those described in adolescents in the previously published series. One Chinese article is available on Medline describing a series of 10 adults having femoral head fracture with acetabular labral tears. It stresses on the importance of diagnosing this lesion and repairing it [16]. Further exploration of the article and comparison to our findings is impossible due to the language barrier [16].

An orthopaedic surgeon aiming for hip preservation surgery should keep in mind the status of the acetabular labrum while assessing a patient with a femoral head fracture. A high index of suspicion of complete posterior acetabular labrum avulsion is raised in front of a hip CT scan showing the acetabular fleck sign even in an adult patient. This finding is important in posing the surgical indication and in completing the preoperative surgical planning.

#### CONFLICT OF INTEREST STATEMENT

None declared.

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