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Case Report

Displaced osteochondral fracture of the posterolateral tibial plateau associated with an acute anterior cruciate ligament injury

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ABSTRACT

An osteochondral fracture of the posterolateral tibial plateau associated with an anterior cruciate ligament (ACL) injury in a 24-year-old boy is reported. Anterior cruciate ligament rupture is accompanied by bone contusions resulting from the impact of the posterolateral tibial plateau on the anterior part of the lateral femoral condyle. The osteochondral fracture of the posterolateral tibial plateau matched the site where the bone bruise is observed.

Introduction

Anterior cruciate ligament (ACL) rupture results from a mechanism that leads to an abnormal translation of the tibia on the femur forcefully impacting the posterior aspect of the tibial lateral plateau against the anterior portion of the lateral femoral condyle [1–3]. This causes a pattern of injury known as the “kissing contusion” well seen at MRI [2–7]. Bone bruising of the femur and tibia are common complications associated with ACL injuries, but the combined occurrence of a displaced osteochondral fracture of the posterolateral tibial plateau, which seems to result from the same mechanism that caused the bone bruise, is unique. A displaced osteochondral fracture like the one described in this case, to the best of our knowledge, has not been previously described.

Case report

A 24-year-old man sustained a twisting injury to his right knee in a motorcycle accident. He presented at the emergency department complaining of pain and swelling of the knee.

Physical examinations

Knee alignment was normal. Range of motion (ROM) was limited to 70° of flexion due to pain and joint effusion, with tenderness at the lateral joint line. Lachman test was positive and posterior drawer and valgus and varus instability tests at 0° and 30° of knee flexion were all negative.

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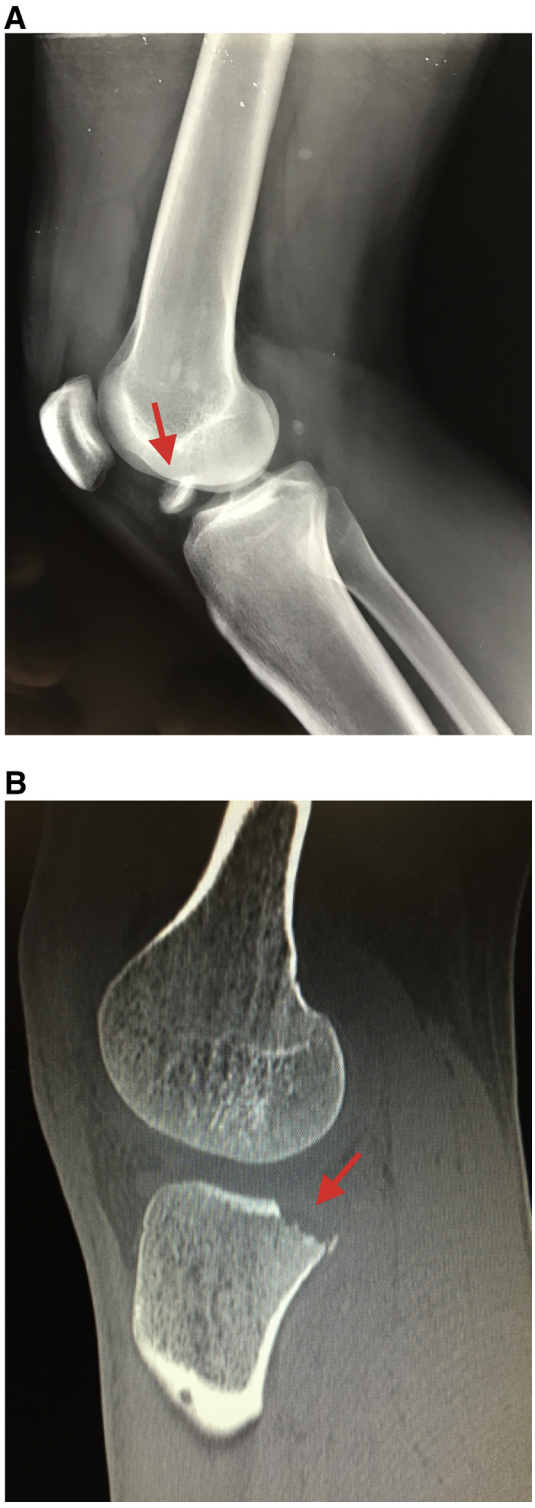

Fig. 1. (A) Radiograph and (B and C) CT scan images of the knee showing osteochondral fracture of the posterolateral tibial plateau. (D) Arthroscopic view showing lateral meniscus (LM), lateral femoral condyle (LFC) and posterolateral tibial plateau fracture (green arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

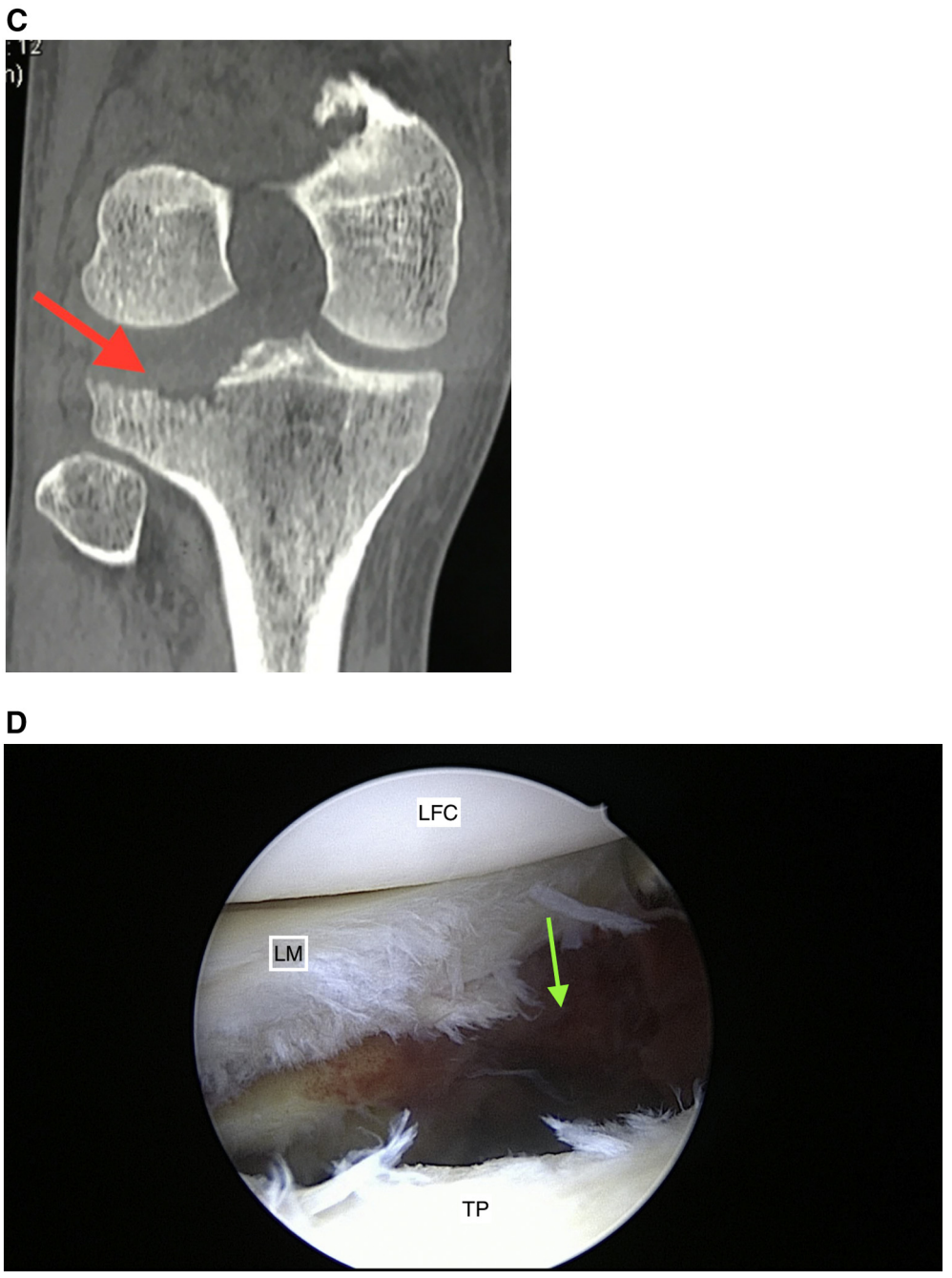

Fig. 1. (*continued*)

Imaging evaluation

Plain radiographs of the left knee showed a bone fragment in the intercondylar notch simulating a fracture of the tibial spine. A computed tomography (CT) revealed an osteochondral defect on the posterolateral rim of the tibial plateau (Fig. 1A, B and C).

Surgical technique

Three days after injury, surgery was performed under spinal anesthesia and tourniquet control. Under anesthesia, it was observed positive pivot-shift, anterior drawer and Lachman tests. Arthroscopic examination revealed an ACL injury, an osteochondral fracture of the posterolateral tibial plateau, and a huge fractured osteochondral fragment, measuring 3 cm × 1,5 cm in the intercondylar

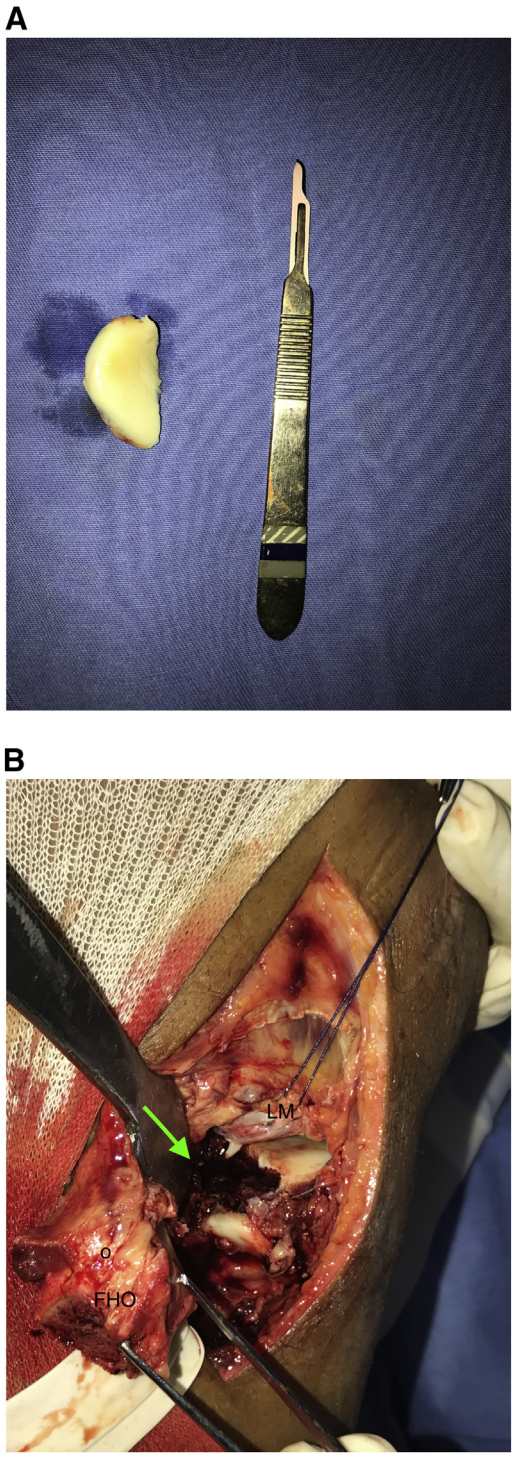

Fig. 2. (A) Osteochondral fragment. (B) Intraoperative view showing the site of the posterolateral fragment; (C and D) Postoperative XR (LM - lateral meniscus, FHO - fibular head osteotomy).

notch (Fig. 1D; Fig. 2A and B). Menisci and PCL were intact. It was decided that the ACL reconstruction would be performed later due to the severity of trauma and the possible complications of an acute ACL reconstruction.

After arthroscopic removal of the loose body and after recognizing the defect of the lateral tibial plateau, a lateral approach centered at the fibular head, was performed. The peroneal nerve was isolated, the proximal third of the fibula was exposed and a Chevron osteotomy of the fibular head was done. Lateral meniscus was elevated proximally and the articular surface defect was put

Fig. 2. (*continued*)

under vision.

The osteochondral fragment was then accurately reduced in its native location fixed with two 3.5 cannulated screws and one 1.5 K wire. The lateral meniscus was then reinserted and the osteotomy of the fibular head fixed with a long cortical 4.5 screw. Final radiographs demonstrated a good reduction with hardware well positioned in an extra-articular position (Fig. 2C and D).

Postoperatively, the patient was kept with a non-weight bearing regimen for 6 weeks in an effort to protect the osteochondral fracture fixation. ROM was started the day after surgery as tolerated and went through to 0°–90° at 2 weeks and to 0°–120° at 4 weeks. After 3 months, with radiographic evidence of fracture healing, full weight bearing was started on. After 6 months, the patient had ROM of 0°–130° and presented with an anterior knee laxity (Lachman and anterior drawer tests were positives). Next step will be ACL reconstruction.

Discussion

The most important finding of this study was to present a rare event associated to an ACL injury, which is an intra-articular displaced osteochondral fracture of the lateral tibial plateau.

Bone bruise of the lateral compartment of the knee is found in 80% or more of the ACL injuries and represents a “footprint” of the mechanism of injury [8,9]. This bone injury is most likely caused by the impaction of the posterior aspect of the lateral tibial plateau against the lateral femoral condyle, which occurs during dislocation of the knee at time of injury [10–13].

To our knowledge, there is only two case report regarding osteochondral posterolateral tibial plateau fracture in the literature [14,15]. In the first case Tei et al. reported a displaced osteochondral fragment of the posterolateral tibial plateau, which were small and associated with an ACL injury in a skeletally immature patient. The osteochondral fragment was removed arthroscopically because the fragment was too thin and too small for reduction and fixation. In the second case report Jiang et al. reported two cases of a displaced osteochondral fragment of the posterolateral tibial plateau which were fixed through a posterolateral approach to the knee without fibular head osteotomy.

What is new in this case report is the presence of a large displaced osteochondral fragment of the posterolateral tibial plateau that needed to be fixed in a skeletally mature patient through an opened lateral approach with an osteotomy of the proximal fibula. This might be considered the most severe form of an injury associated to an isolated ACL rupture and bony impaction.

Conclusion

A case of an osteochondral fracture of the posterolateral tibial plateau associated with an ACL rupture in a skeletally mature patient is reported. This injury was thought to be caused by the impaction of the posterior aspect of the lateral tibial plateau against the lateral femoral condyle during internal rotational and anterior displacement of the tibia at the time of injury.

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