

# Intra-articular lateral femoral condyle fracture following an ACL revision reconstruction

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Received: 17 September 2009 / Accepted: 6 November 2009  
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**Abstract** Lateral femoral condyle fractures following an ACL reconstruction are rare. To our knowledge, this is the first case report of a lateral femoral condyle fracture following a revision ACL reconstruction. The patient's fracture was intra-articular, had a significant amount of soft tissue damage, and was further complicated by a large defect involving the bone tunnel from the ACL revision reconstruction. The patient was treated with an open reduction and internal fixation and recovered well.

**Keywords** Anterior cruciate ligament ·  
Lateral femoral condyle fracture · Revision reconstruction

## Introduction

Anterior cruciate ligament (ACL) reconstruction is a common procedure among young and active patients. However, a small subset of patients may have surgical complications such as fractures of the patella, patellar tendon rupture, loss of motion, and hardware failure, which can significantly affect their outcomes [7]. Lateral femoral condyle fracture is a rare complication of primary ACL reconstruction [1, 2, 6, 8, 10] through drill holes that may have served as stress concentrators and reduced the energy absorbing capacity of the bone [3]. No cases of lateral femoral condyle fracture following a revision ACL reconstruction were found in the literature. This case report presents a complex fracture of the lateral femoral condyle following an ACL revision reconstruction.

## Case report

A 33-year-old healthy Caucasian male was referred to our tertiary care center for evaluation and treatment of a lateral femoral condyle fracture that occurred approximately 3 weeks after undergoing a left ACL revision reconstruction at an outside institution. Six years previously, the patient had an index one incision endoscopic left knee ACL reconstruction using a bone–patellar tendon–bone allograft and a partial medial and lateral meniscectomy after sustaining an ACL tear. He reported that his graft never functioned well, and he had continued instability throughout these 6 years. Therefore, he underwent a two incision revision ACL reconstruction using an autogenous bone–patellar tendon–bone graft placed into a separate femoral tunnel than the original one incision ACL reconstruction. He initiated a postoperative rehabilitation program, which additionally included physical therapy for low back pain. Three weeks following his revision ACL reconstruction, he underwent a manipulation of his left SI joint that involved axial distraction of his left lower extremity. Immediately following the manipulation, the patient experienced significant left knee pain and swelling. A left knee MRI scan showed an intra-articular lateral femoral condyle fracture. He was placed into a knee immobilizer and referred to our center for further treatment.

His initial physical examination, 6 weeks following his revision ACL reconstruction, revealed a 2+ left knee effusion and significant tenderness along the lateral joint line. Passive knee flexion resulted in significant pain, with limited motion from 30° to 75°. Lachman, posterior drawer, varus, and valgus stress were not evaluated secondary to pain.

Radiographs demonstrated a displaced lateral femoral condyle fracture. A thin slice CT scan was also obtained to

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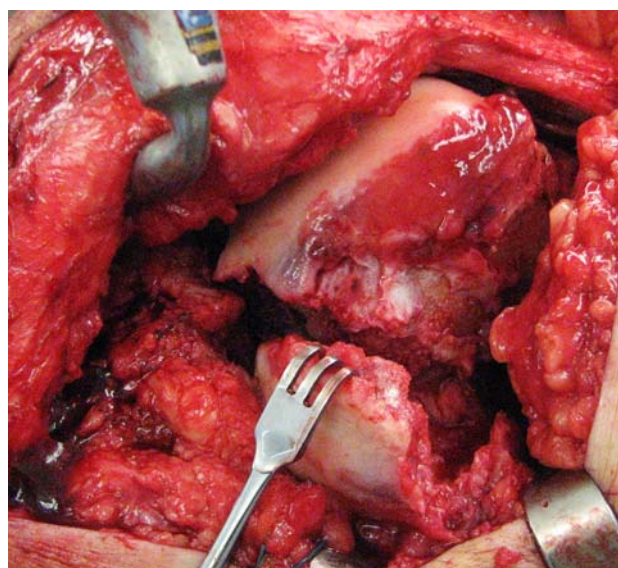
**Fig. 1** Preoperative sagittal (a) and coronal (b) CT of the left knee demonstrating evidence of an intra-articular lateral femoral condyle fracture

evaluate the fracture pattern in relation to his revision ACL femoral tunnel, which showed intra-articular involvement of the fracture (Fig. 1).

A lateral parapatellar arthrotomy incision was made to identify the fracture fragment (Fig. 2). The fracture plane was complex and involved the entire weight bearing surface of the central aspect of the lateral femoral condyle from anterior to posterior. The ACL graft was nonfunctional and displaced into the lateral gutter because the fracture involved the revision reconstruction tunnel, and the graft was subsequently removed. Other than the lateral capsule and soft tissues around the popliteus tendon and fibular collateral ligament, there was little soft tissue still attached to the intra-articular fracture fragment. Reduction was obtained with the use of Kirschner wires and evaluated with intraoperative fluoroscopic imaging. Final fixation of the fracture fragment was performed using three 4.5-mm cannulated titanium screws with washers. It was not possible to use a plate for fixation because the fracture fragment was so far distal. In addition, compression of the fracture fragment medially was not possible due to the large defect from the reconstruction tunnel which would have displaced the fracture fragment into varus. Allograft bone graft was used to fill the large defect involving the revision ACL reconstruction tunnel.

Radiographs and thin slice CT scan images obtained 6 months postoperatively demonstrated interval healing of his fracture. Since sufficient interval healing of his fracture had occurred, he underwent arthroscopy, debridement, and manipulation.

Thirteen months postoperatively the patient had returned to work and was participating in a low-impact exercise program. At this time, a 3-Tesla MRI scanner was used to obtain an MRI scan of the patient's knee (Fig. 3). The

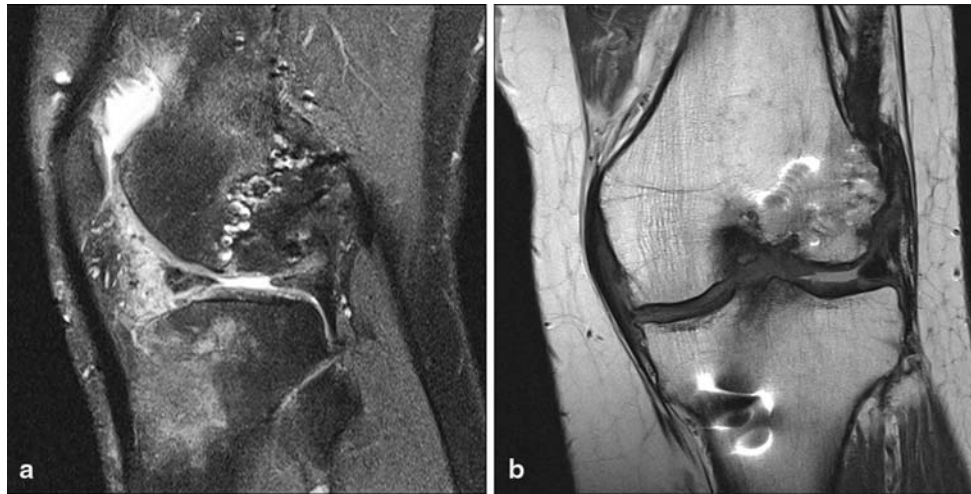


**Fig. 2** Intraoperative photograph of the left knee demonstrating the complex fracture plane involving the entire weight bearing surface of the central aspect of the lateral femoral condyle

evaluation of his lateral compartment revealed that the lateral femoral condyle fracture had healed with a mild step off of the lateral femoral condyle. The patient's range of motion was 3° to 115° of knee flexion.

## Discussion

The key finding of the present study was that it brought to light the issue of a possible stress increase on the lateral femoral condyle due to a second tunnel placement during a revision ACL reconstruction. The complex fracture presented in this case report had several distinct and unique



**Fig. 3** One year postoperative sagittal (a) and coronal (b) MRI of the left knee demonstrating that the fracture had healed with a mild step off of the lateral femoral condyle

features. It was intra-articular, had a significant amount of soft tissue damage and was further complicated by a large defect involving the bone tunnel from the ACL revision reconstruction. Along with an open reduction and internal fixation, the use of bone graft was necessary to fill the revision ACL femoral tunnel. Fortunately, we were able to return the patient to a near normal level of activity, and MRI scans obtained 1 year postoperatively demonstrated that the fracture had healed.

Lateral femoral condyle fractures following an ACL reconstruction are rare. To our knowledge, this report is the first to describe a displaced lateral femoral condyle fracture following a revision ACL reconstruction. Earlier case reports have described femoral fractures following acute injury [4] and primary ACL reconstructions. In the previously described cases following ACL reconstruction [1, 2, 6, 8–10], the fracture occurred through bone tunnels, which may have acted as stress risers. Similarly, in our case, the fracture occurred directly through the revision femoral tunnel, which was placed in a slightly different position than his original endoscopic tunnel.

Revision ACL reconstruction is inherently complicated because the location of the primary graft tunnel and previous fixation hardware limits the choice of new tunnel placement. It has been reported that improper femoral and/or tibial tunnel placement is responsible for up to 60% of graft failures in primary ACL reconstruction [5]. Also, an accelerated rehabilitation program has been sighted as one of possible risk factors for stress fractures following ACL reconstruction especially, if unexplained pain arises during the rehabilitation program [1].

The severe injury reported in this case report highlights one of the rare, yet potential problems associated with an ACL revision reconstruction. Whenever dealing with an

ACL revision reconstruction one must take note of the original tunnel placement and make the revision tunnel in a manner that minimizes an increase in stress. Ultimately, in our case, the open reduction and internal fixation of the fracture resulted in healing of the patient's fracture and an acceptable range of motion. Thus, the issue of a possible stress increase on the lateral femoral condyle due to tunnel placement should be considered when selecting a revision ACL reconstruction technique.

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