

# Chronic Popliteus Tendon Avulsion Fracture with Chronic Knee Pain and Locking

## A Case Report

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### Abstract

**Case:** A 31-year-old man who had a chronic popliteus avulsion fracture 18 years earlier treated with physical therapy presented with new onset left knee locking after exercising at the gym. Magnetic resonance imaging demonstrated a chronic popliteus avulsion fracture of the lateral femoral condyle. Surgical excision of the nonunited bone fragment was performed.

**Conclusion:** Isolated popliteus avulsion fractures are extremely rare injuries that occur primarily in a skeletally immature patient population and for which treatment options are not well understood. Treatment options include conservative management and early surgical intervention, both of which have inherent risks and benefits. We recommend prompt imaging with computed tomography (CT) to better characterize the degree of injury and follow-up CT imaging in patients who do not undergo early surgical intervention.

The posterolateral corner (PLC) of the knee is a complex structure that consists of 6 static stabilizers (lateral collateral ligament, popliteus tendon, popliteofibular ligament, lateral capsule, arcuate ligament, and fabellofibular ligament), 3 muscles (biceps femoris, lateral head of the gastrocnemius, and popliteus muscle), and the iliotibial band. The PLC mainly acts to resist varus forces and to externally rotate the knee. The PLC is rarely injured in isolation. In fact, more than 72% of the time, injuries to the PLC are associated with injuries to other structures, most commonly the ACL and PCL<sup>1,2</sup>.

The popliteus tendon, one of the knee stabilizers of the PLC, is injured in isolation, only 10% of the time<sup>3</sup>. Even less common are isolated avulsion fractures of the popliteus tendon, with only 15 cases reported in children younger than 16 years of age<sup>4,5</sup>.

Current treatment for an acute avulsion fracture of the popliteus tendon includes conservative management, surgery to repair the fragment, and surgical excision of the avulsed bone<sup>6-9</sup>. Long-term outcomes for each approach have not been studied. We report the second documented case of a chronic popliteus tendon avulsion fracture that was originally managed without surgery but subsequently required operative intervention secondary to chronic symptomatic locking of the knee. In the first case, surgical intervention ultimately became necessary secondary to the patient developing asymptomatic valgus deformity<sup>10</sup>.

The patient was informed that data concerning the case would be submitted for publication, and he provided consent.

### Case Report

A 31-year-old male physician presented with left knee pain and knee locking that occurred only with flexion during squatting exercises at the gym. Eighteen years earlier, he had experienced an isolated popliteus tendon avulsion fracture of his left knee that occurred after sustaining a blow to his outstretched knee in a lacrosse event. He was managed initially with immobilization followed by 3 months of physical therapy.

On physical examination, the bone fragment was noted to be mobile with the knee in the flexed position. The fragment would move distally and then lock the knee, with maximum flexion of the knee. To unlock, the knee had to be flexed and the bone fragment would have to be manipulated in the proximal and anterior directions, thus allowing for full mobility. Physical examination of the knee was otherwise negative with intact ligaments.

Initial imaging from the acute avulsion injury 18 years earlier was unavailable. Current imaging included radiographs that demonstrated a 1.2 x 1.6 cm well-corticated bone fragment lateral to the left femoral condyle (Fig. 1). Follow-up magnetic resonance imaging showed a chronic, nonunited avulsion fracture of the popliteus tendon with a well-corticated bone fragment in the popliteal sulcus, thinning of the popliteus tendon, and a trace joint effusion (Fig. 2). The decision was made to excise the fragment.

**Disclosure:** The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJS/CC/B774>).

**Keywords** young adult; male; popliteus avulsion; surgery; lateral femoral condyle



Fig. 1-A

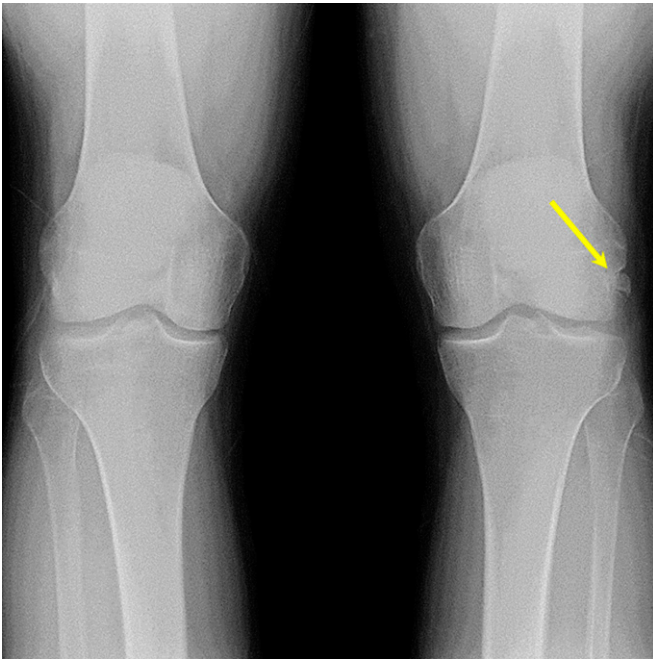


Fig. 1-B

Radiographs of the left knee: Sunrise view and standing AP view of both knees show the nonunited bone fragment next to the lateral femoral epicondyle (arrow).

Arthroscopy of the knee was performed with standard anteromedial and anterolateral portals. Diagnostic arthroscopy demonstrated intact chondral surfaces with no meniscal abnormalities. The cruciate ligaments were intact. The lateral gutter was examined, and the nonunited lateral bone fragment was found to be extra-articular. It was decided to proceed with open excision of the fragment.

Next, an incision was made centered over the lateral epicondyle. The iliotibial band was split, and the bone fragment



Fig. 2-A

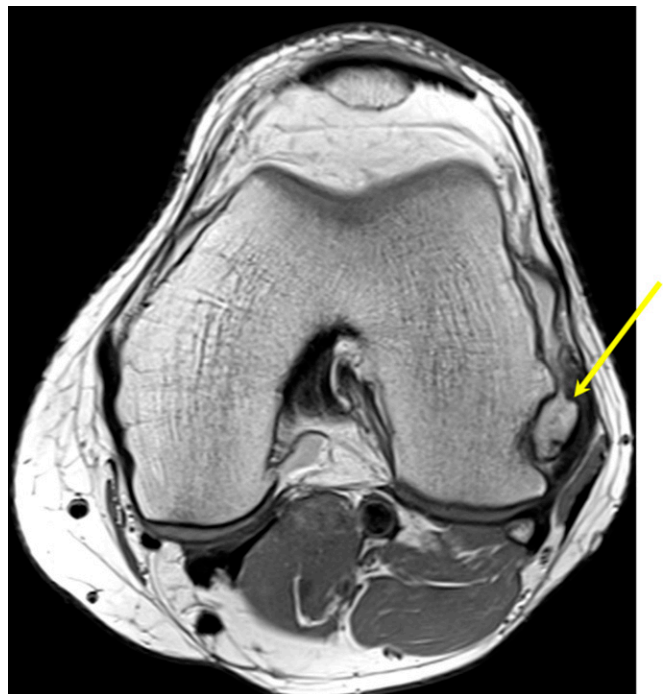


Fig. 2-B

MRI of the left knee: Coronal and axial PD images show the bone fragment overlying the popliteus notch (yellow arrow) with marked thinning of the popliteus tendon (red arrow) consistent with a chronic tendon injury. MRI = magnetic resonance imaging



Fig. 3-A



Fig. 3-B

Intraoperative photographs. **Fig. 3-A** Lateral incision over the posterolateral corner of the knee with intact iliotibial band overlying the bone fragment. **Fig. 3-B** Direct examination of the nonunion bone fragment from the chronic popliteus avulsion fracture of the lateral femoral condyle.

was identified and delivered bluntly (Fig. 3). The wound was closed in a layered fashion.

Final diagnostic arthroscopy was performed, specifically examining the lateral gutter. The site of closure was identified, and no loose osseous fragments were noted.

Immediately postoperatively, the patient had full extension and flexion of his knee without locking. The patient was discharged home the same day and instructed to weight bear as tolerated. Within 3 days, he was walking with a normal gait. He performed physical therapy 2 times per week for a total of 6 weeks, followed by an independent strength training program. Six months after surgery, he had no pain or locking and full range of motion.

### Discussion

This is the second documented case of the surgical treatment of a chronic popliteus avulsion fracture. In the first documented case, nonoperative management ultimately led to a valgus deformity secondary to the formation of a lateral physeal bone bridge, whereas in this case, conservative treatment ultimately resulted in a locked knee<sup>10</sup>. This case raises the question as to whether nonoperative management of an acute avulsion fracture is the best approach<sup>10</sup>. Furthermore, several

case reports note the success of early intervention in acute popliteus avulsion fractures with successful outcomes<sup>11-13</sup>.

Several authors have argued that nonoperative management of isolated popliteal tendon avulsion fractures is indicated when there is no ligament injury<sup>5,8</sup>. Although long-term outcomes of conservative management are not well studied, it is clear that in the short-term, these patients can return to full activities within a few months and avoid the recovery and risks associated with surgery<sup>5,8</sup>. Although a proportion of the nonoperative patients will ultimately require surgical intervention, the majority will likely remain asymptomatic, furthering the case for initial conservative management. Furthermore, this injury to the popliteus tendon could have long-term implications, should the patient require total knee arthroplasty at a later date.

It is difficult to know which patients would be better treated with early surgery. One useful tool, which has not been documented in any of the previous case reports, would be a computed tomography (CT) scan of the knee. A CT scan could assist in quantifying the size and morphology of the avulsed fragment and the degree of the injury, which could direct treatment options to help determine the healing potential of the fragment. In our case, the bone fragment went on to a nonunion, which ultimately necessitated surgical intervention. If nonoperative treatment is

performed, the patient should be followed up closely to determine whether surgery is indicated on a delayed basis either for symptoms or for deformity secondary to a growth arrest. ■

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