Popliteomeniscal Fascicle Tears

Matthew Camarillo, MD; Darren L. Johnson, MD

Abstract: Isolated popliteomeniscal fascicle tears are often unrecognized and misdiagnosed. Patients typically have vague symptoms and often-normal magnetic resonance imaging and physical examination findings. Isolated injuries are often misdiagnosed and mistreated, leading to delayed surgical treatment. Unrecognized tears can lead to continued disability, lateral meniscus tears, and chondral lesions. Appropriate diagnosis and treatment with inside-out lateral meniscus repair will allow the athlete to return to activity. [Orthopedics. 2014; 37(3):187-190.]

Tears of popliteomeniscal fascicles have been reported in high numbers of knee injuries with anterior cruciate ligament tears and injuries to the posterolateral complex. \(^1\) Yet, isolated popliteomeniscal fascicle tears are often difficult to recognize and diagnose due to the vague symptoms and often-normal magnetic resonance imaging (MRI) and physical examination findings. \(^2,3\) These isolated injuries are often misdiagnosed and mistreated, which often leads to delayed surgical treatment. Without proper diagnosis and treatment, popliteomeniscal fascicle tears can lead to continued disability, complex tears of the lateral meniscus, which are often irreparable, and chondral lesions because of the large mobile fragment. \(^4\)

The popliteomeniscal fascicles are composed of 3 distinct fasciculi, anteroinferior, posteroinferior, that attach to the lateral meniscus at the popliteal hiatus (Figure 1). \(^5\) Sussmann et al \(^6\) suggested that, embryologically, the fascicles allow vascular supply to the lateral meniscus. The fascicles are important to the controlling motion of the lateral meniscus during both flexion and extension of the knee. \(^1,7,8\)

Simonian et al \(^7\) showed lateral meniscal motion doubled when the popliteomeniscal fascicles were sectioned in cadaveric knees. Kimura et al \(^9\) stated that tears of the popliteomeniscal fascicles lead to the loss of normal peripheral hoop stresses,
Injuries are often seen in the younger athletic population. These injuries are typically found in athletes who engage in sports that involve repetitive twisting, such as wrestling, dancing, and taekwondo. Mechanisms of injury can involve a single traumatic event or an insidious onset after repeated microtrauma. Patients typically present with vague lateral-sided knee pain with activity. Reports of locking or giving way may or may not be present.

A standard knee examination typically does not reveal abnormalities. LaPrade and Konowalchuk found placing patients in a figure-4 position replicated their symptoms and was therefore useful in identifying those with popliteomeniscal fascicle tears. Isolated popliteomeniscal fascicle tears can often be difficult to detect on MRI. A high-quality MRI with 3-mm cuts and a high index of suspicion may decrease false-negative readings. Studies by Simonian et al. and LaPrade and Konowalchuk showed that 9 patients who were felt to have normal findings on MRI were found, arthroscopically, to have popliteomeniscal fascicle tears. These tears were found on MRI retrospectively. Johnson and DeSmet and Peduto et al. reported that popliteomeniscal fascicles can be best evaluated on T2-weighted images in the sagittal plane.

Arthroscopic evaluation, the gold standard for diagnosis, allows for direct visualization of the popliteomeniscal fascicles at popliteal hiatus and evaluation of lateral meniscal mobility. LaPrade reported visualization of the popliteomeniscal fascicles is best done with a 30° arthroscope with the knee at neutral rotation and 20° of flexion. Simonian et al. showed that, once visualized, the lateral meniscus must be probed to assess mobility. Thompson et al. reported that less than half of the lateral meniscus shows mobility when the popliteomeniscal fascicles are intact. Shin et al. proposed that when more than half of the lateral meniscus shows mobility, a popliteomeniscal fascicle tear should be suspected.

Once diagnosed arthroscopically, isolated popliteomeniscal fascicle tears should be surgically repaired to prevent further disability. In the short term, a hypermobile meniscus leads to further intrinsic meniscal damage, which decreases healing rates, as well as chondral damage from abnormal wear and tear. Long term, if untreated, a hypermobile meniscus will require a “functional” complete lateral meniscectomy, meaning the beginning of the end to the lateral compartment. Several techniques have been described for repair. LaPrade and Konowalchuk described open repair of the lateral meniscus back to the popliteomeniscal fascicles and popliteus tendon complex. The results were reported for 6 patients. All returned to unrestricted activity with resolution of symptoms with an average 3.8-year follow-up. Simonian et al. reported resolution of symptoms in 3 patients with an inside-out repair technique. After repair, most patients are allowed to return to athletic activity at 4 months.

**Case Reports**

**Patient 1**

A 14-year-old female competitive dancer presented re-
porting lateral-sided knee pain and locking and catching of her right knee for 3 years. Initially, the locking and catching occurred every few months; it had been increasing in frequency. She stated that once her knee was at 90° of flexion, it would lock. She was unable to extend it and had to release it by going into deep flexion with a twist of the knee. Once this had occurred, her knee would swell for 2 days. She reported no inciting event. An examination revealed no effusion, knee range of motion of 0° to 150°, no patellofemoral symptoms, and stable ligamentous findings. Passively, the locking and catching could not be reproduced. She did have pain on the lateral joint line on McMurray examination. Magnetic resonance imaging revealed increased signal at the lateral meniscus and a tear of the popliteomeniscal fascicles (Figure 3).

The patient was taken to the operating room, where diagnostic arthroscopy revealed a tear of the popliteomeniscal fascicles and increased mobility of the lateral meniscus (Figure 4). An inside-out meniscal repair was performed from the 9 to 11 o’clock position. A total of five 2-0 Ethibond (Ethicon, Somerville, New Jersey) sutures were placed (Figure 5). Postoperatively, the patient was allowed to weight bear with the knee brace locked in extension. Therapy continued with range of motion of 0° to 90° with quadriceps strengthening from 0° to 45°. Two months postoperatively, the knee brace was unlocked and therapy continued with quadriceps strengthening of 0° to 90°. At 3 months, the brace was discontinued and she was allowed to start plyometrics. Four months postoperatively, the patient did not report pain or locking in
her knee with plyometric exercises. A functional evaluation test revealed only a 1.8% deficit. The patient was allowed to start sport-specific activity without restrictions and gradual return to full dance training.

**Patient 2**

A 15-year-old female multisport athlete felt a pop in her right knee after sliding into a base. She presented reporting recurrent locking symptoms in her knee for 9 months. Magnetic resonance imaging showed tears of the popliteomeniscal fascicles and lateral meniscus. Arthroscopic evaluation showed a hypermobility of the lateral meniscus (Figure 6). An inside-out lateral meniscus repair with a fibrin clot was performed (Figure 7).

The patient returned to athletic activity. Nine months postoperatively, when squatting to pick up a basketball, she again felt a pop in her knee and presented with a locked knee. Magnetic resonance imaging and arthroscopic evaluation showed a re-tear of the lateral meniscus. A revision inside-out lateral meniscus repair with fibrin clot augmentation was performed. Seven months postoperatively, the patient again re-injured her knee during a collision while playing soccer. The patient had immediate swelling and limited knee extension. Diagnostic arthroscopy again revealed an unhealed re-torn lateral meniscus (Figure 8). At this point, a partial lateral meniscectomy was performed. The patient has since returned to athletic activity with a narrowed lateral joint line (Figure 9). This case illustrates the effects of late treatment for popliteomeniscal fascicle tears.

**CONCLUSION**

Isolated popliteomeniscal fascicle tears are often difficult to diagnose. Symptoms of vague lateral knee pain with or without locking should heighten one’s suspicion for a possible popliteomeniscal fascicle tear. Arthroscopic evaluation of the popliteomeniscal fascicles and mobility of the lateral meniscus provides the best diagnostic study for isolated tears. Surgical stabilization of the lateral meniscus must be performed for resolution of symptoms, preservation of the lateral compartment, and return to previous activity.

**REFERENCES**