Snapping Knee Caused by a Popliteomeniscal Fascicle Tear of the Lateral Meniscus in a Professional Taekwondo Athlete

JONG-HOON PARK, MD; KYUNG-HAN RO, MD; DAE-HEE LEE, MD

abstract

Full article available online at Healio.com/Orthopedics. Search: 20120621-31

A 19-year-old male professional Taekwondo athlete presented with a 2-year history of pain-free snapping of his right knee. He reported that his right knee joint gave way during games and training and that he could induce pain-free snapping between the proximal-to-fibular head and the lateral knee joint line. None of these physical findings suggested a meniscal pathology or ligamentous instability. Routine radiographs were normal. Magnetic resonance imaging of his right knee joint showed that the shape of the lateral meniscus was normal, and no lateral meniscus tears existed. On arthroscopic examination, popliteal hiatus view showed a posterosuperior popliteomeniscal fascicle tear between the posterior horn of the lateral meniscus and the posterior joint capsule just posteromedial to the popliteus tendon. With medial traction by probing, this popliteomeniscal tear made visible the significant subluxation of the posterior horn of the lateral meniscus to the center or anterior half of the tibial plateau. Based on the diagnosis of a posterosuperior popliteomeniscal tear of the right knee, Fast-Fix (Smith & Nephew, Andover, Massachusetts) was used for the direct repair of the peripheral portion of the lateral meniscus and joint capsule, targeting the popliteomeniscal junction. At 24 months postoperatively, the patient was performing athletic exercises relevant to his profession and was taking part in Taekwondo games, with no pain or recurrence of snapping. To the authors’ knowledge, this is the first report of snapping of the lateral aspect of the knee due to a popliteomeniscal fascicle tear.

Drs Park, Ro, and Lee are from the Department of Orthopedic Surgery, Korea University Anam Hospital, Korea University College of Medicine, Seoul, Korea.

Drs Park, Ro, and Lee have no relevant financial relationships to disclose.

Correspondence should be addressed to: Dae-Hee Lee, MD, Department of Orthopaedic Surgery, Korea University Anam Hospital, Korea University College of Medicine, Anam-dong 5-ga, Seongbuk-gu, Seoul 136-705, Korea (eoak22@empal.com).

doi: 10.3928/01477447-20120621-31

Figure: Clinical photograph of snapping of the right knee showing similarities to anterior translation of the lateral tibial plateau (arrow).
Although a popliteomeniscal fascicle tear can occur in an otherwise stable knee with no apparent meniscal or cartilage lesions, its diagnosis may be missed due to its nonspecific clinical symptoms and the lower sensitivity of routine coronal and sagittal slices on magnetic resonance imaging (MRI).\(^1\,^2\) Snapping of the lateral aspect of the knee has been reported to occur due to discoid lateral meniscus\(^3\) and subluxations of the biceps femoris\(^4\) and popliteus.\(^5\) Although a popliteomeniscal fascicle tear can cause mechanical symptoms, such as locking or snapping due to subluxation of the lateral meniscus,\(^6\) it is more likely to cause vague knee pain. To the authors’ knowledge, no cases have been reported of snapping of the lateral knee due to a popliteomeniscal fascicle tear. This article describes a patient with a popliteomeniscal fascicle tear presenting as snapping of the lateral aspect of the knee. The patient was difficult to diagnose due to his unusual pain-free snapping and the absence of abnormal MRI findings.

**Case Report**

A 19-year-old male professional Taekwondo athlete presented with a 2-year history of pain-free snapping of his right knee. During the previous 2 years, he had not been examined by a sports medicine physician. The patient reported no severe acute trauma. His professional training included repeat strenuous kicking and jumping and competition with another athlete at least 10 times a day. He reported that his right knee joint gave way during games and training and that he could induce pain-free snapping of his right knee. These conditions prevented him from concentrating on his Taekwondo exercises.

Initial clinical examination revealed no localized joint-line tenderness around the knee, and he had full knee range of motion (ROM) with no effusion. Snapping was evident between the proximal-totibular head and the lateral knee joint line. It appeared similar to the snapping of a discoid lateral meniscus, with or without tearing. Snapping was observed when he flexed his knee approximately 45° to 90° and an axial load was added to his knee joint (Figure 1) and appeared similar to anterolateral subluxation of the proximal tibia. Although he could induce snapping symptoms voluntarily, passive snapping by a physician was difficult. None of these physical findings suggested a meniscal pathology or ligamentous instability. Diagnostic imaging was performed to find the cause of snapping since he had not undergone imaging examinations during the 2 years following symptom onset. Routine radiographs were normal. Magnetic resonance imaging of his right knee joint showed that the shape of the lateral meniscus was normal, and no intrasubstance or peripheral tears of the lateral meniscus or evidence of a popliteomeniscal fascicle tear existed (Figure 2).

The differential diagnosis of snapping of the lateral aspect of the knee in the patient could be classified into intra- and extra-articular causes. The possible intra-articular causes were discoid lateral meniscus with or without tearing, loose body, and popliteomeniscal fascicle tearing. The possible extra-articular causes were subluxation of the muscular tendinous portion, such as the iliotibial band or biceps femoris and posterolateral corner injury of the knee. Discoid lateral meniscus and an intra-articular loose body were ruled out by the MRI results. Iliotibial band and biceps femoris subluxation were also excluded by the location of snapping, and a posterolateral corner injury was ruled out by normal dial and posterolateral drawer test results. These findings suggested that snapping was caused by subluxation of the lateral meniscus due to popliteomeniscal fascicle tearing.

Arthroscopic exploration to determine the intra-articular cause of snapping was performed under general anesthesia using conventional anteromedial and anterolateral portals. Arthroscopy revealed no meniscal, ligamentous, or articular cartilage lesions. A posterolateral portal was created by transillumination using a light source introduced into the anteromedial portal. Insertion of the arthroscope through the posterolateral portal con-
firmed that no lateral meniscal tears existed, even in the posterior horn. To evaluate the popliteomeniscal fascicle, the arthroscope was inserted into the popliteal hiatus. In examining the lateral gutter from the anterolateral portal, the knee was kept at 15° to 20° of flexion, which enabled the arthroscopic cannula to pass through the lateral gutter and reach the popliteal hiatus. This view showed a posterosuperior popliteomeniscal fascicle tear between the posterior horn of the lateral meniscus and the posterior joint capsule just posteromedial to the popliteus tendon (Figure 3A). With medial traction by probing, this popliteomeniscal tear made visible the significant subluxation of the posterior horn of the lateral meniscus to the center or anterior half of the tibial plateau (Figure 3B). Based on the diagnosis of a posterosuperior popliteomeniscal tear of the right knee, Fast-Fix (Smith & Nephew, Inc, Andover, Massachusetts) was used for the direct repair of the peripheral portion of the lateral meniscus and joint capsule, targeting the popliteomeniscal junction. The stability of the lateral meniscus was confirmed by the absence of subluxation with medial traction of the probe.

No postoperative complications occurred, and the patient was permitted early mobilization immediately postoperatively, but partial weight bearing with a crutch was recommended for 2 weeks. A voluntary attempt to induce snapping of the lateral aspect of the knee 2 weeks postoperatively was unsuccessful. After 2 weeks of partial weight bearing, the patient was advanced to weight bearing as tolerated and simultaneously started quadriceps-strengthening exercises to achieve adequate quadriceps control for full weight-bearing ambulation. The patient showed a gradual improvement in knee ROM over the next 4 weeks, resulting in full ROM. The volume and intensity of sports-specific activities were gradually increased over the next 3 months, and, 6 months postoperatively, he was able to participate completely in sports activities. At 24 months postoperatively, the patient was performing athletic exercises relevant to his profession and was taking part in Taekwondo games with no pain or recurrence of snapping.

**DISCUSSION**

This article describes the diagnosis and treatment of a snapping knee caused by a posterosuperior popliteomeniscal fascicle tear of the lateral meniscus. The snapping symptom could be induced voluntarily, but evidence of structural disorder around the knee joint was not detected by physical examination or radiologic evaluation. A posterosuperior popliteomeniscal fascicle tear was confirmed by arthroscopic examination via a popliteal hiatus view and by the finding of meniscal subluxation into the joint during arthroscopic probing. Direct repair of the popliteomeniscal junction resulted in a clinically successful outcome.

Snapping of the lateral aspect of the knee can be caused by a discoid lateral meniscus, an intra-articular loose body, iliobibial band friction syndrome, or subluxations of the biceps femoris and popliteus tendons. However, to the authors’ knowledge, lateral-aspect snapping caused by a popliteomeniscal fascicle tear has not been previously reported. Since the first report of the attachment of the popliteus tendon to the lateral meniscus, several cadaveric studies have revealed the structures and functions of the popliteomeniscal fascicules. The popliteomeniscal fascicles consisted of 3 fascicles (anteroinferior, posterosuperior, and posteroinferior), resulting in static and dynamic connections between the lateral meniscus and the popliteus tendon. The popliteomeniscal fascicles are also important in controlling the motion of the lateral meniscus during knee flexion and extension.

Popliteomeniscal fascicle tears are difficult to diagnose because their clinical manifestations and MRI findings resemble those of other conditions. Although injury to an isolated popliteomeniscal fascicle may result in instability of the lateral meniscus and mechanical symptoms, the clinical manifestations of popliteomeniscal fascicle tears are nonspecific. A study of 6 patients with isolated tears of the popliteomeniscal fascicles of the lateral meniscus showed that none had specific symptoms, although all had vague pain in the lateral aspect of the knee while performing sports activities. Similarly, a study of 3 patients with popliteomeniscal fascicle tears reported that all 3 had a history of intermittent mechanical knee locking episodes with mild pain. In contrast, a young patient with a popliteomeniscal fascicle tear presented with limited extension...
and severe pain. None of these 3 patients had a definite history of trauma, with pain occurring only during particular sports activities, such as takedowns in wrestling and kicking in soccer.

The outcomes of open and arthroscopic repair of popliteomeniscal fascicle tears have been successful. Open repair of 5 patients with popliteal meniscal fascicle tearing resulted in a complete resolution of symptoms in all patients, at a mean follow-up of 3.8 years. Moreover, meniscal repair using an arthroscopic inside-out technique resolved the mechanical symptoms in 3 patients, with the integrity of repair confirmed by second look arthroscopic examination in 1 patient, and MRI and arthrographic examination in the others.

**CONCLUSION**

Snapping of the lateral aspect of the knee can be caused by a popliteomeniscal fascicle tear with no trauma in a professional athlete. On arthroscopy, the popliteal hiatus view can be valuable for the diagnosis of popliteomeniscal fascicle tear, a condition difficult to diagnose due to nonspecific results on physical examination and low accuracy of MRI.  

**REFERENCES**