

CASE REPORT: SNAPPING BICEPS FEMORIS TENDON DUE TO ABNORMAL FIBULAR MORPHOLOGY

Mia McNulty¹, Joseph Carreau, MD², Nathan Hendrickson, MD², Matthew Bollier, MD²

ABSTRACT

Background: Several cases of snapping biceps femoris tendons have been reported with anomalous insertions of the distal tendon insertion or in the context of trauma. There are only three published cases due to abnormal fibular head morphology.

Methods/Results: We present a case of unilateral snapping of the biceps femoris tendon in a 19 year old. We decided to proceed with surgery after the patient failed a trial of non-operative treatment and had significant functional limitations. Surgical exploration of the posterolateral knee showed a prominent ridge on the posterior aspect of the fibular head over which the biceps femoris tendon was snapping with deep knee flexion. The bony ridge was resected, leaving surrounding structures intact, including the insertion of the biceps femoris tendon. The patient experienced resolution of snapping symptoms and associated pain.

Conclusions: Although rare, snapping of the biceps femoris tendon can cause pain and functional limitation. In this case, resection of a prominent ridge on the fibular head resolved snapping and pain.

Level of evidence: Level five

Keywords: tendon snapping, biceps femoris tendon, fibular morphology

INTRODUCTION

Although rare, several cases of symptomatic snapping of biceps femoris tendon have been reported in the literature. Most commonly, previous cases have attributed the snapping to abnormalities with the distal insertion of tendon^{1,2,3,4,5}. To the best of our knowledge, only three prior cases of snapping biceps femoris tendons have been, at least in part, attributed to abnormal fibular morphology: one due to fibular head exostosis⁶, one case that caused snapping with knee flexion and internal rotation⁷, and another case where both a prominent fibular head and an anomalous insertion of the biceps femoris tendon together caused snapping⁸.

We report on a 19 year old with unilateral painful snapping of the biceps femoris tendon with knee flexion, found to be due to a prominent ridge on the fibular head, which was successfully treated with partial excision of the bony prominence.

CASE REPORT

History

A 19 year old male presented with a 2 year history of unilateral left lateral knee pain and snapping. There was no known trauma to the knee, but the patient did note the onset of symptoms after he began weight lifting 2 years prior, and that symptoms usually resolved with rest. He had experienced worsening of the pain associated with the snapping in recent months, and began having pain at rest. He did not wish to further explore conservative treatment options and was referred to our clinic for surgical evaluation.

Physical examination and imaging

Physical examination revealed no obvious deformity, swelling, or effusion. There was tenderness to palpation over the distal biceps femoris tendon approaching its insertion on the fibular head. There was no joint line tenderness, and both the ligamentous exam and extensor mechanism were normal. Notably, McMurray's exam was normal and did not reproduce snapping. With deep knee flexion while weight bearing, the biceps femoris tendon was noted to snap over a prominent fibular head (Figure 1), then snap back into place with subsequent knee extension. This snapping was observed with the tibia in neutral rotation relative to the femur.

¹University of Colorado School of Medicine

²University of Iowa Hospitals and Clinics

Corresponding Author:

Mia McNulty

University of Colorado School of Medicine

13001 E 17th Pl

Aurora, CO 80045

Email: mia.mculty@ucdenver.edu

Phone: (303)819-8938

No funding was obtained or utilized for this case report.

The authors have no disclosures that would pose potential conflicts of interest.



Figure 1: Preoperative picture of prominent fibular head immediately before patient reproduces snapping with active knee flexion

X-rays showed no evidence of gross bony abnormality with normal joint alignment and spacing. Pre-operative knee MRI did not show any meniscus or ligament tearing. In addition, there was normal articular cartilage and no bony prominences or fibrous bands in fibular head region.

Surgical findings

An incision was made longitudinally over the posterior lateral aspect of the left knee. Careful dissection was carried out to isolate the tendinous insertion of the biceps femoris as well as the common peroneal nerve. The nerve was visible and protected throughout the case. The tendon was observed to have normal attachments, without abnormal or anomalous insertions on the fibula or tibia. A prominent ridge on the fibular head was observed, and intraoperative knee flexion and extension demonstrated visible snapping of the biceps femoris tendon over the ridge (Figure 2). This excess bone was resected, but the remainder of the fibular head and its ligamentous attachments, including the lateral collateral ligament, were left intact.



Figure 2: Intra-operative photograph of the prominent ridge on the fibular head

Knee arthroscopy showed a small frayed tear of the posterior root of the lateral meniscus that did not cause instability. The frayed portion of the meniscus was debrided, and a partial synovectomy of the anterior knee was carried out. No other abnormalities were noted on arthroscopic survey of the knee. The patient was instructed to weight bear as tolerated and had no restrictions on range of motion postoperatively.

CLINICAL OUTCOME

At a four week post-operative appointment, the patient had complete resolution of snapping symptoms. His range of motion at that time was 0-100 degrees of flexion. He planned to begin physical therapy for postoperative mobilization and return to sport. A phone interview with the patient at six months after surgery was conducted. The patient reported complete resolution of the snapping, full knee range of motion and return to all activities.

DISCUSSION

Anatomically, the long head of the biceps femoris originates from the ischial tuberosity and forms a tendon proximal to the knee joint. As Terry et al. described, proximal to the fibular head, the tendon bifurcates to yield a direct arm that inserts on the posterolateral fibular head and an anterior arm that inserts on the lateral fibular head with additional fibers inserting on the anterolateral tibia lateral to Gerdy's tubercle. The anterior arm also gives rise to an anterior aponeurosis, which continues distally to cover the anterior compartment of the leg, as well as a lateral aponeurotic component that attaches broadly over the lateral and posterior lateral collateral ligament. The complex insertion of the biceps femoris contributes to knee flexion, external rotation,

while also acting as a dynamic stabilizer of the knee^{4,9}.

Snapping of the distal insertion of the biceps femoris tendon is a rare condition, but it has been documented in the literature. Most reported cases found anomalous insertions of the distal biceps upon surgical exploration^{1,2,3,4,5}. Date et al. found three distinct tendinous components to the distal biceps femoris insertion, with one inserting at the posterolateral fibular head, one inserting on the lateral fibular head, and one inserting on the anterolateral proximal tibia. The anterolateral portion displaced over the fibular head and caused snapping when the knee was carried past 100 degrees of flexion, with worsening snapping with internal rotation. Resection of the anterolateral and the lateral tendinous insertion sites resolved the snapping.

Hernandez et al. and Kristensen both published cases where the biceps femoris tendon inserted entirely on the anterolateral tibia, without fibular insertions. In the case reported by Hernandez et al., the snapping occurred between 100-120 degrees of flexion with concurrent internal rotation. Reinsertion of the tendon onto the posterolateral fibula stopped the snapping over the fibular head. Similarly, the case reported by Kristensen et al. detailed snapping that occurred with flexion past 90 degrees, but was instead treated by resection of the lateral aspect of the fibular head without altering the tendon's insertion. Lokeic et al. reported a case where an abnormal anterior fibular insertion was found to cause snapping when the knee was extended from full flexion. Reinsertion of the tendon on the typical posterolateral aspect of the fibula prevented snapping from occurring. Kissenberth et al. reported on a case of symptomatic snapping with onset during rehabilitation for an uncomplicated anterior cruciate ligament repair of the contralateral knee. Upon surgical exploration, the authors noted that a more distal branching of the biceps femoris tendon into the direct and anterior arm, when combined with knee flexion, caused the anterior extension of the tendon's attachment to subluxate over the fibular head. Surgical transection of the anterior arm with reinsertion on the posterolateral fibula led to resolution of symptoms. Other authors have reported cases of trauma-induced snapping^{10,11}, and snapping in the context of seemingly normal anatomy^{12,13}.

Three prior publications found abnormal fibular head anatomy to cause snapping^{6,7,8}. As with our patient, each of the cases treated the snapping with surgical resection of the abnormal aspects of the fibula. However, the abnormal fibular morphology was distinct in each of the three previously reported cases. In the case described by Fung et al., the bilateral presence of fibular head exostosis were found to cause the symptomatic snapping, which occurred when the knee was flexed past 90 degrees. This caused fraying of the distal biceps inser-

tion, and the patient was treated with debridement of the frayed tissue and removal of the fibular exostosis, later undergoing the same procedure on the contralateral extremity. Bagchi et al. described a case where snapping occurred with 80 to 100 degrees of knee flexion secondary to an anomalous anterolateral proximal tibial insertion of the biceps femoris tendon and a prominent fibular head due to the presence of fibrocartilage, bone, fibrocollagenous tissue, and myxoid degeneration. Initial treatment included conservative resection of the prominent fibular head, but return of symptoms required a second, more extensive excision. A similar procedure was carried out on the contralateral knee after it too developed snapping symptoms.

Our case was most similar to the case reported by Bach et al., where the authors found tendon subluxation over a prominent fibular head between 80 and 100 degrees of knee flexion with concomitant internal rotation. However, in our case, knee flexion in the absence of internal rotation was sufficient to provoke tendon subluxation.

Similar to Bach et al., however, the fibular head abnormality was a prominent bony ridge, and symptom resolution resulted in resection of the bony prominence without disruption of the insertions of the biceps femoris or the lateral collateral ligament.

To our knowledge, this is the first reported case of unilateral snapping of the biceps femoris tendon due to abnormal fibular bony morphology that occurred with flexion of the knee in neutral rotation. In the absence of injury, most documented cases of snapping biceps femoris tendon have been bilateral, with symptoms occurring unilaterally or bilaterally^{1,2,4,5,6,7,8}. This case is unique in that the patient had a unilateral onset of symptoms. Because the snapping occurred when the patient bent the knee in deep flexion, even in the absence of internal rotation, the symptoms were frequent and disruptive. In this case, our patient found the persistent symptoms to be intrusive enough to warrant surgery. Resection of the fibular head prominence led to complete resolution of symptoms.

Although several cases of snapping biceps femoris tendons have been reported in the literature, the phenomenon is most frequently attributed to anomalous insertions of the tendon. Rarely, abnormal bony morphology of the fibula can cause similar symptoms. We present a case, novel in that the snapping was unilaterally due to a prominent ridge on the fibular head, and that the symptoms occurred in the absence of internal rotation. We show that snapping due to abnormal morphology of the fibular head can be treated with bony resection, without disruption of the surrounding structures.

REFERENCES

1. **Date H, Hayakawa K, Nakagawa K, Yamada H.** Snapping knee due to the biceps femoris tendon treated with repositioning of the anomalous tibial insertion. 2010. *Knee Surg Sports Traumatol Arthrosc.* 20:1581-1583.
2. **Hernandez JA, Ruis M, Noonan KJ.** Snapping knee from anomalous biceps femoris tendon insertion: a case report. 1996. *The Iowa Orthopaedic Journal.* 16: 161-163.
3. **Lokiec F, Velkes S, Schindler A, Pritsch M.** the snapping biceps femoris syndrome. 1992. *Clinical Orthopaedics and Related Research.* 283: 205-206.
4. **Kissenberth MJ, Wilckens JH.** The snapping biceps femoris tendon. 2000. *The American Journal of Knee Surgery.* 13(1):25-28.
5. **Kristensen G, Nielsen K, Blyme PJH.** Snapping knee from biceps femoris tendon A case report. 1989. *Acta Orthopaedica Scandinavica.* 60(5): 621-621.
6. **Fung DA, Frey S, Markbreiter.** Bilateral symptomatic snapping biceps femoris tendon due to fibular exostosis. 2008. *Journal of Knee Surgery.* 21(1):55-57.
7. **Bach BR, Minihane K.** Subluxing biceps femoris tendon: an unusual case of lateral knee pain in a soccer athlete. 2001: *The American Journal of Sports Medicine.* 29(1): 93-95.
8. **Bagchi K, Grelsamer RP.** Partial fibular head resection for bilateral snapping biceps femoris tendon. 2003. *Orthopedics.* 26(11):1147-1149.
9. **Terry GC, LaPrade RF.** The biceps femoris muscle complex at the knee. 1996. *The American Journal of Sports Medicine.* 24(1): 1-8.
10. **Bansal R, Taylor C, Pimpalnerkar AL.** Snapping knee: an unusual biceps femoris tendon injury. 2005. *The Knee.* 12:458-460.
11. **Bernhardson AS, LaPrade RF.** Snapping biceps femoris tendon treated with an anatomic repair. 2010. *Knee Surg sports Traumatol Arthrosc.* 18:1110-1112.
12. **Crow SA, Quach T, McAllister D.** Partial tendon release for treatment of a symptomatic snapping biceps femoris tendon: a case report. 2009. *Sports Health.* 1(5): 435-437.
13. **Vavalle G, Capozzi M.** Symptomatic snapping knee from biceps femoris tendon subluxation: an unusual case of lateral pain in a marathon runner. 2010. *J Orthopaed Traumatol.* 11: 263-266.