An Unusual Case of a Fibular Sesamoid Phalangeal Ligament Tear Caused By Chronic Trauma

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Injuries involving the first metatarsophalangeal joint and its associated structures are common, especially in athletes. However, injuries to the hallucal sesamoid complex constituted only 3% of all podiatric sports medicine injuries reported by Agosta. This case study reports a female ballet dancer with an isolated fibular sesamoid retraction injury that presented with a history of chronic microtrauma secondary to overuse. When consulting epidemiologic studies of forefoot injuries involving the hallucal sesamoid complex, we were unable to find a single instance of an isolated retraction of the fibular sesamoid resulting from chronic use, demonstrating the unusual nature of this case. (J Am Podiatr Med Assoc 109(2): 162-165, 2019)

Hallucal sesamoid injuries are usually caused by excessive force to the metatarsophalangeal joint during the propulsive phase of gait.[1] The tibial and fibular sesamoids are held in place by a trio of ligaments: the tibial sesamoid phalangeal ligament, the intersesamoid ligament, and the fibular sesamoid phalangeal ligament. Disruption of these ligaments can cause sesamoid retraction, which can be seen on magnetic resonance imaging (MRI) and plain film radiographs. The plantar plate serves primarily to protect the metatarsal head from excess compression loads. In addition, the plantar plate maintains the structural integrity of the joint by preventing hyperextension of the metatarsophalangeal joint and preventing the toes from splaying or spreading in excess.[2]

Injuries involving the first metatarsophalangeal joint are ranked as the third highest cause of lost playing time by athletes. Within those injuries to the first metatarsophalangeal joint, turf toe is a common example involving the plantar plate.[3] A common misconception regarding turf toe is that only those who play the sport of football acquire this injury. However, turf toe can be found in numerous sports that place the forefoot in a position of overextension at the first metatarsophalangeal joint. The most common mechanism is one of extreme dorsiflexion at the first metatarsophalangeal joint when the foot is placed in a plantarflexed position. This leads to excessive stretch, tears and, in more severe cases, rupture of the plantar capsule.[4]

The severity of the injury and appropriate treatment are determined by the extent of the soft-tissue damage. Conservative treatment is deemed appropriate in the case of turf toe injuries lacking disruption of the plantar plate or other associated soft-tissue structures. However, rupture of the plantar plate and disruption of the hallucal sesamoid complex occurs only in rare acute cases of extreme dorsiflexion of the first metatarsophalangeal joint. In these cases, surgery is often the only effective treatment option to address the turf toe injury.[5]

Although our patient displayed some characteristics associated with a turf toe injury, the distinguishing trait of this case was the isolated tear of the fibular sesamoid phalangeal ligament. This was demonstrated as proximal retraction of the fibular sesamoid. In addition, turf toe injuries tend to involve acute trauma to the metatarsophalangeal joint; however, our patient acquired the injury from overuse. These findings illustrate the unique presentation of our patient's injury.

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Case Report

A 17-year-old female ballet dancer with no significant medical history presented to the office with a 1-year history of left foot pain localized to the plantar aspect of the first metatarsal head. She is an avid ballet dancer who denied any recent trauma or injury to the left foot. However, the patient related that, at the onset of the pain, she had been practicing the demi-pointe ballet technique. (The demi-pointe is a ballet technique that places the metatarsophalangeal joint in maximal dorsiflexion. This is different from the en pointe technique, where the full weight of the body is placed onto the tip of the toes.) During physical examination, the patient felt pain on plantarflexion at the first metatarsophalangeal joint but was asymptomatic on dorsiflexion. There was pain on direct palpation of the fibular sesamoid of the left foot.

Radiographic evaluation was negative for osseous abnormalities of both the left and right feet. In the left foot, both the tibial and fibular sesamoids were parallel and nondisplaced on dorsoplantar view. The right foot was asymptomatic and was imaged for comparison (Fig. 1).

The original diagnosis of sesamoiditis was made with a differential diagnoses of bursitis, a stress fracture, and tendonitis. Subsequent treatment over the next 6 weeks involved a corticosteroid injection consisting of 1 cc of dexamethasone sodium phosphate (4 mg/cc) and 1 cc of 1% lidocaine plain directed to the lateroplantar aspect of the fibular sesamoid complex. Additional treatment included the following: a 1/4-inch felt aperture pad, instruction to decrease ballet activity, oral antiinflammatory drugs, and physical therapy. Physical therapy incorporated contrast baths and active and passive range-of-motion (ROM) exercises.

The patient returned to the office 6 months after the initial visit because of increased pain and subsequent failure of conservative treatment. On reevaluation of the patient, pain was now appreciated during dorsiflexion of the first metatarsophalangeal joint, whereas it had been absent on prior evaluation. In addition, the patient had pinpoint tenderness under the fibular sesamoid of the left foot. There was no apparent swelling or skin abnormalities.

Magnetic resonance imaging of the left foot was performed using T1-wighted and short tau inversion recovery imaging techniques (Figs. 2 and 3). The images display no osseous deformity, with normal signal intensity of both fibular and tibial sesamoids.

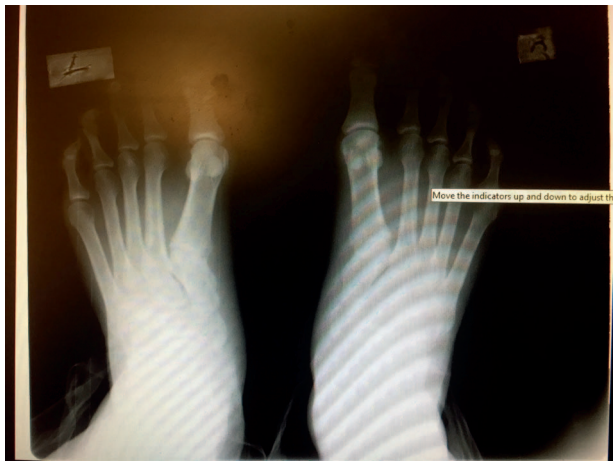


Figure 1. Dorsoplantar view at initial presentation. No osseous abnormalities were noted. The right foot was used for comparison only.

On T1-weighted axial view, the following findings were noted: mild edema at the posterior capsular attachment of the metatarsophalangeal joint at the distal first metatarsal, fluid at the distal attachment site of the fibular sesamoid phalangeal ligament, soft-tissue swelling within the first metatarsophalangeal joint space, and laxity at the proximal attachment of the fibular sesamoid phalangeal ligament. Proximal retraction of the fibular sesamoid was also appreciated on short tau inversion recovery axial view. The above findings were indicative of a distal tear to the fibular sesamoid phalangeal ligament.[6] With these MRI findings, in addition to failed conservative treatment, the patient elected to have surgical repair of the fibular sesamoid ligament.

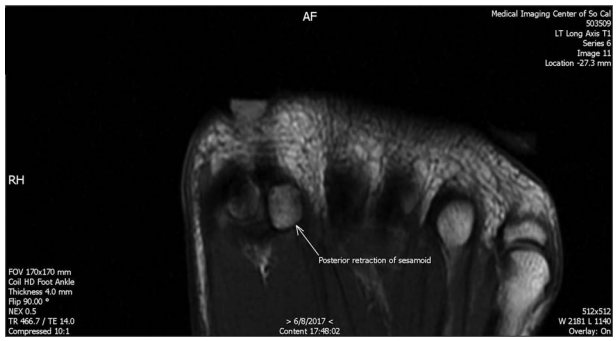


Figure 2. Long-axis T1-weighted magnetic resonance imaging scan of the left foot. Note an isolated posterior (proximal) retraction as indicated by the arrow. This is indicative of ligamentous laxity or damage to the distal portion of the fibular sesamoid phalangeal ligament.

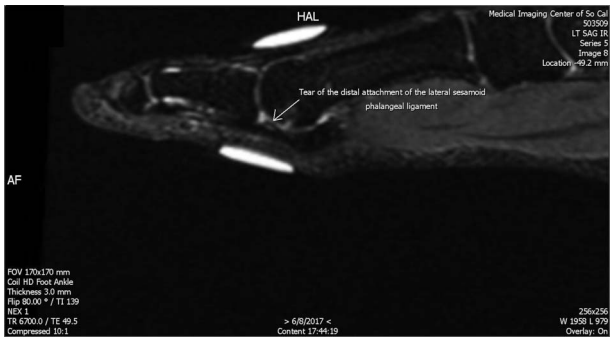


Figure 3. Sagittal view of the left foot, using short tau inversion recovery magnetic resonance imaging, revealing a tear of the distal attachment of the fibular sesamoid phalangeal ligament.

Surgical Technique

The procedure was performed under general anesthesia. An 8-mL local anesthetic block consisting of 0.5% bupivacaine was used. In addition, a perioperative prophylaxis of 2 g of intravenous cefazolin was administered. A distal-to-proximal longitudinal incision was made plantarly just lateral to the midline of the left first metatarsophalangeal joint (Fig. 4). Neurovascular structures were noted, and extra caution was exercised to avoid trauma to these structures. The flexor hallucis brevis tendon and the associated capsule were torn on the lateral aspect. The flexor hallucis brevis tendon was then mobilized lateroplantarly, and a Mini QUICKANCHOR (DePuy Synthes, Raynham, Massachusetts) anchor was used to stabilize the tendon into the inferior aspect of the proximal phalanx and verified with intraoperative fluoroscopy. Subsequently, the plantar lateral capsule was repaired using 2-0 ORTHOCORD (DePuy Synthes) suture. Care was taken to prevent excessive abduction of the hallux at the first metatarsophalangeal joint.[6]

Repair of the plantar capsule was performed with care taken to prevent a varus deformity of the hallux.[7] Normal anatomical alignment of the fibular sesamoid was restored. A 0.062-inch Kirschner wire was used to fixate the toe in a plantarflexed position (Fig. 4). Intraoperative fluoroscopy was then used to verify adequate positioning of the Kirschner wire. Deep closure was then performed with 2-0 Vicryl (Ethicon, Somerville, New Jersey). Skin was closed with 3-0 nylon with four horizontal mattress sutures. On closure, an additional 8 mL of 0.5% bupivacaine was injected in and around the surgical site. Lastly, occlusive petrolatum gauze and fluff compression dressing was applied and the foot was placed in a boot with a toe guard. Capillary refill time was performed with brisk refill, concluding the operation.



Figure 4. Postoperative photograph obtained 3 weeks postoperatively from the plantar aspect of the left foot. Note the location and orientation of the surgical incision. The first metatarsophalangeal joint was placed in a plantarflexed position to reduce the stress on the newly anchored sesamoid and associated soft-tissue structures involved during the procedure.

Postoperative Care

The patient remained nonweightbearing for 2 weeks postoperatively. At this stage, sutures and Kirschner wires were removed and the patient was instructed to begin ambulating in a walking boot. At 6 weeks, passive ROM was established, with a steady progression to active ROM. In addition to ROM activities, the patient underwent weightbearing exercises, massage therapy, and strength-training exercises, including dorsiflexion and plantar flexion exercises of the first metatarsophalangeal joint. At 12 weeks, the patient returned to moderate ballet activities. Six months after the procedure, the patient has reported minimal to no pain and has returned to ballet. The patient does admit to some "tightness" in the flexor tendon that impairs the ability to dance en pointe fully with proper technique.

Discussion

The closest related instances of fibular sesamoid displacement injuries were found in the work of

Cortes and Baumhauer.[8] They noted that dislocation of the fibular sesamoid is quite rare and is often the result of acute trauma, unlike the patient in this case study. Furthermore, the fibular sesamoid dislocations reported by Cortes and Baumhauer were primarily attributable to the rupture of the intersesamoid ligament leading to the lateral displacement of the fibular sesamoid in association with other various ligamentous and osseous injuries. No reported cases of an isolated retraction injury of either sesamoid were reported in this article.[1]

In one comprehensive study of 917 athletes presenting to a podiatric sports medicine office, it was reported that only 3% of all the injuries reported were associated with sesamoid pain, and another 3% were associated with metatarsal head pain. There was a single sesamoid stress fracture and no reported cases of sesamoid dislocation or retraction.[9] This article demonstrated the rarity of athletic injuries involving the fibular sesamoid and the fibular sesamoid phalangeal ligament.

Conclusions

A 17-year-old female ballet dancer presented to the office with left fibular sesamoid pain that was insidious in nature. Plain film radiographs demonstrated no osseous deformity or abnormality. The patient was initially diagnosed with sesamoiditis that did not respond to conservative treatment. Six months after initial presentation and failed conservative treatment, an MRI scan was ordered and the patient was diagnosed with a tear of the left fibular sesamoid phalangeal ligament with proximal retraction of the fibular sesamoid that was repaired surgically. Other surgical options, such as sesamoidectomy, could be performed at the discretion of the surgeon and the patient. On performing procedures involving the fibular sesamoid and its associated ligaments, special care must be taken to avoid excessive release of the plantar lateral capsule for fear of creating a hallux varus deformity; however, this iatrogenic deformity is quite rare.[7]

Patients that present with sesamoid pain should also be examined for possible stress fractures of the hallucal sesamoids. If radiographic evaluation is negative for signs of fracture and there is a low clinical suspicion for soft-tissue tears or ruptures, a diagnosis of sesamoiditis can be made. To confirm this diagnosis, an MRI or bone scintigraphic scan can be obtained to check for bony edema.

When an MRI scan displays a lack of bony edema in the sesamoids, sesamoiditis can be ruled out. To diagnose the isolated fibular sesamoid phalangeal ligament tear, one should look for the proximal retraction of the fibular sesamoid in addition to edematous changes to the distal portion of the plantar capsule on MRI. After MRI, surgical intervention involving a plantar capsule repair and the return of the sesamoid(s) to normal anatomical alignment is deemed necessary once conservative measures have failed.

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References

1. Patel T, Song A, Lomasney L, et al: Acute fibular sesamoid fracture: one part of the spectrum of sesamoid pathologies. Orthopedics **37:** 706, 2014.
2. Deland J, Lee K, Sobel M, et al: Anatomy of the plantar plate and its attachments in the lesser metatarsal phalangeal joint. Foot Ankle Int **16:** 480, 1995.
3. Allen LR, Flemming D, Sanders TG: Turf toe: ligamentous injury of the first metatarsophalangeal joint. Mil Med **169:** xix, 2004.
4. Hamilton GA, Ford LA, Richey JM: "Dislocations of the Foot and Ankle", in *McGlamry Comprehensive Textbook of Foot and Ankle Surgery*, 4th Ed, Vol 1, edited by JT Southerland, p 1620, Wolters Kluwer Health/Lippincott Williams & Wilkins, Philadelphia, 2013.
5. Drakos MC, Fiore R, Murphy C, et al: Plantar-plate disruptions: "the severe turf-toe injury." Three cases in contact athletes. J Athl Train **50:** 553, 2015.
6. Awh MH: Turf toe. Radsource Website. Available at: http://radsource.us/clinic-turf-toe/. Accessed December 27, 2017.
7. Donely B: Acquired hallux varus. Foot Ankle Int **18:** 586, 1997.
8. Cortes Z, Baumhauer J: Traumatic lateral dislocation of the great toe fibular sesamoid: case report. Foot Ankle Int **25:** 164, 2004.
9. Agosta J: Epidemiology of podiatry in sports medicine clinic. Aust Podiatrist **28:** 93, 1994.