Peroneal Retinaculum Repair with Groove deepening Surgery

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Abstract

Background: Athlete is a 20-year-old male colligate soccer athlete. Athlete has a previous medical history of multiple left lateral ankle sprains and an ACL reconstruction with meniscus repair on the right knee. Athlete reported that the injury occurred during a game when he came into contact with another athlete during a slide tackle. His ankle inverted and rolled, and he heard and felt a snap. The athlete was tender to palpation around anterior talo-fibular ligament (ATFL), calcaneofibular ligament (CFL), and the peroneal tendons. MMT was 4/5 during eversion and plantar flexion, 5/5 during dorsiflexion and 5/5 for inversion but + for pain. Patient was + for anterior drawer, + pain during inversion, eversion talar tilt test, - bump test, - compression test, - Thompson test. He presented with a lateral ankle sprain but never healed and had sensation of instability. Upon further inspection by the athletic trainer, the athlete's peroneal tendon was snapping out of the groove active eversion and the peroneal tendon could be easily pushed out of the groove. **Differential diagnosis:** lateral ankle sprain, snapping peroneal tendon, facture of the distal fibula, ankle contusion. **Treatment:** The athlete was originally treated with conservative treatment for a lateral ankle sprain. The athlete was not improving and was complaining of a painful snapping sensation in ankle with a sensation of instability. The patient was referred to see the orthopedic. Radiographs and an MRI were performed. The MRI confirmed the superior peroneal retinaculum was torn on the left ankle. The peroneal tendon would not stay in the groove due to the torn superior peroneal retinaculum. Peroneal retinaculum repair with groove deepening surgery was performed to fix the issue. The athlete was casted to prevent movement for three weeks after surgery then moved into a boot with partial weight bearing allowed, then to full weight bearing by week six. The athlete then progresses to focusing on range of motion (ROM), strengthening exercises, proprioception exercises, and function exercises and drills to return back to play. The rehabilitation process is six months before returning back to play. **Uniqueness:** the mechanism of injury came off as an ankle sprain but upon further inspection the patient had a snapping peroneal tendon. The injury itself is not very common and only occurs in a small amount of ankle injuries. This makes this injury rare in the athletic training room. There are not many large studies on the different types of surgeries performed for a torn superior retinaculum. There is no evidence on which surgical technique is the most superior with the best results compared to other surgical techniques. **Conclusion:** A soccer athlete was slide tackled by another soccer athlete that caused his ankle to invert and roll. This athlete was originally diagnosed with a lateral ankle sprain but upon further inspection when the athlete was not improving, he was diagnosed with a torn superior peroneal retinaculum. The athlete had peroneal retinaculum repair with groove deepening surgery.

Introduction

Tearing of the superior peroneal retinaculum is an uncommon injury but when it does occur, it is usually associated with sports-related activities. This injury typically occurs in relation to forceful contraction of the peroneal musculature while the foot is dorsiflexed, with or without inversion of the ankle (Jaeho Cho 2014). This causes the superior peroneal retinaculum to fail. There are four types of superior peroneal retinaculum tears according to the Oden's classification system. Type 1 is when the superior peroneal retinaculum is stripped from the malleolus, thereby forming a pouch-like configuration into which the peroneal tendons can dislocate, type 2 is when a tear of the superior peroneal retinaculum at its attachment to the distal fibula, type 3 is a distal fibular avulsion fracture at the attachment of the retinaculum to the lateral malleolus and type 4 is a tear of the retinaculum at its posterior attachment. Type 1 superior peroneal retinaculum injuries are the most common, followed by type 3. Due to the mechanism of injury, superior peroneal retinaculum tears usually go misdiagnosed as just a lateral ankle sprain. Many people go undiagnosed or diagnosed very late when they have a superior retinaculum tear. Peroneal tendon dislocation occurs in 0.3–0.5 % of all traumatic ankle events and is often misdiagnosed and therefore underreported (Van, 2016). Operative repair of the injury is usually preferred over conservative management owing to the high recurrence rates (Suh, 2018). Conservative treatment has been shown to not be successful in athletes and the physically active. Escalas et al. reported a study that included conservative treatment and resulted with an unstable and painful ankle in 74% of cases (Staresinic, 2013).

Purpose

The purpose of this case report was to introduce a 20 year-old colligate soccer athlete who received a torn superior retinaculum tear that was causing snapping peroneal tendons. Following the injury the athlete opted in to perform surgery to fix the injury and begin return to play. An overview of this unique injury is presented to obtain additional information and a better understanding regarding the complete injury of the superior retinaculum, from onset to return to play of a colligate soccer player.

Anatomy

The lateral compartment of the lower leg contains the peroneus longus and peroneus brevis muscles and tendons. Peroneus brevis originates at the lateral margin of the distal two-thirds of the fibula and inserts on the tuberosity of the lateral side of the fifth metatarsal. Peroneus longus originates on the interosseous membrane, posterior surface of the tibia, and the head and upper two-thirds of the lateral surface of the fibula. It inserts at the base of the first metatarsal. Their primary function is plantar flexion and eversion of the foot at the ankle with secondary function being the important stabilizer of the lateral aspect of the ankle joint (Kumar, 2017). The tendons of the peroneus longus and brevis enter into the retro-malleolar groove deep to the superior peroneal retinaculum. Inferior and anterior to the superior peroneal retinaculum and lateral malleolus, the inferior peroneal retinaculum covers the distal end of the peroneal tendons. A low-lying muscle belly has been identified as a potential cause for inflammation of the peroneal tendons at the level of the superior peroneal retinaculum because of the increased volume within the closed fibro-osseous canal of the retro-fibular space, increasing the risk of peroneal tendon subluxation and chronic tear (Kane, 2017).

Case Report

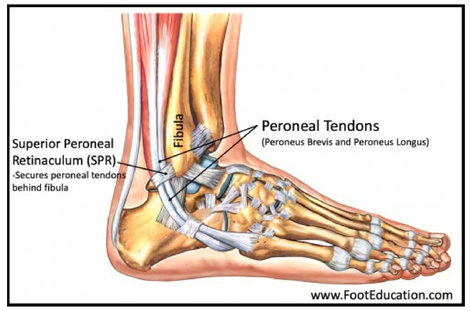
Patient: This colligate soccer player is a 20 year-old athlete that obtained a torn superior retinaculum tear that was causing snapping peroneal tendons. The following information will explain the mechanism of injury, clinical assessments, radiographic findings, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury.

Mechanism of Injury: This injury typically occurs in relation to forceful contraction of the peroneal musculature while the foot is dorsiflexed, with or without inversion of the ankle (Jaeho Cho 2014). This causes the superior peroneal retinaculum to fail. There are four types of superior peroneal retinaculum tears according to the Oden's classification system. Type 1 is when the superior peroneal retinaculum is stripped from the malleolus, thereby forming a pouch-like configuration into which the peroneal tendons can dislocate, type 2 is when a tear of the superior peroneal retinaculum at its attachment to the distal fibula, type 3 is a distal fibular avulsion fracture at the attachment of the retinaculum to the lateral malleolus and type 4 is a tear of the retinaculum at its posterior attachment. Type 1 superior peroneal retinaculum injuries are the most common, followed by type 3.

Clinical Examination: The athlete appeared in the athletic training room after being slide tackled into the inside of his left foot. No obvious deformity and no apparent pain or injury to his knee was observed. During physical examination, swelling and tenderness during palpation was inspected. Athlete also stated that he did not recall hearing or feeling a "pop." The athlete was tender to palpation over his peroneal tendons, anterior talo-fibular ligament, calcaneofibular ligament, as well as pain along the lateral side of his fibula. The peroneal tendon was able to be moved and out of the groove during palpation. Passive and active range of motion was decreased due to pain in each motion. During the clinical special testing for this injury, the athlete tested positive when performing the anterior drawer test, inversion/eversion for pain, and talar tilt test.

Radiographic Findings: Imaging is another important aspect in diagnosing of a torn retinaculum. The soccer athlete was sent for radiographs and an MRI after complaining of snapping and pain on the lateral side of the ankle. Imaging consist of weightbearing radiographs. The weight bearing radiographs consists of anteroposterior, oblique, and lateral views of the foot and ankle. Imaging was unremarkable. Along with the radiographs, MRI is the ideal modality for confirming and identifying the location and severity of peroneal retinaculum tears. Acute peroneal tears appear best with T2-weighted imaging with the patient supine. Tearing of the peroneus brevis may appear as bisected, flattened, or C-shaped. MRI plays an important role in the evaluation of soft tissues and bones. The MRI confirmed the superior reticulum was completely torn.

Surgical Procedure: The procedure performed by for this soccer athlete was a peroneal retinaculum repair with groove deepening. This is a very common procedure done. There are many other variations of this surgery depending on the surgeon's preferences. One controversy is whether having groove deepening or no groove deepening during surgery is more beneficial, but studies do not show either one is superior to the other. There is no reference standard surgical procedure developed for this condition. The peroneal retinaculum repair with groove deepening procedure is by far the most popular and common procedure performed for a torn superior peroneal retinaculum. This procedure is performed with the patient in the lateral position under regional or general anesthesia. A 6-cm curvilinear incision was made over the path of the peroneal tendons immediately posterior to the fibula. The incision starts posterior to the tip of the lateral malleolus and progressed proximally, staying anterior to the sural nerve. The retinaculum is then dissected at the posterior aspect of the fibula, leaving a 3-mm sleeve of retinaculum still attached to the fibula. The fibroosseous retro-fibular sheath is then osteotomized off the posterior aspect of the fibula as an intact structure and hinged posteriorly, leaving the posterior periosteum intact. A 3-mm round burr is then used to deepen the underlying fibula by removing 7-9 mm of underlying cancellous bone from the body of the fibula. The fibroosseous sheath then is impacted back into the deepened groove with the use of a bone impactor, leaving a smooth and deepened floor over which the tendons can glide. After fibular deepening, the pouch formed is then exposed between the bony surface of the lateral malleolus and the superior peroneal retinaculum, where the tendons can subluxate. Multiple drilling with a 1.4-mm Kirschner wire is then applied on the bony surface of the lateral malleolus to produce a bleeding surface. Three to four holes are made along the posterior border of the lower fibula. After repairing the retinaculum to bone through a drill hole in the edge of the bone, the previously maintained sleeve of retinaculum and periosteum is then advanced posteriorly and sutured in a "vest-over-pants" fashion to the posterior repaired peroneal retinaculum, augmenting the retinacular reattachment by creating a double row repair with 2/0 nonabsorbable sutures, taking care to avoid inadvertent capture of the underlying tendons. To avoid suturing the retinaculum too tightly, a flexible injection catheter of 5.5-mm diameter can be used. The catheter will be removed after the retinaculum is sutured. The ankle is to be maintained in eversion and slight dorsiflexion (Jaeho Cho, 2014). The patient is then normally casted in a slightly plantarflexed and inverted position to avoid tension on the retinacular repair. This procedure has been shown to be very successful with a low fail rate and a high patient satisfaction rating.



Rehabilitation and Results

The rehab procedure for a peroneal retinaculum repair with groove deepening is a 6-month recovery period before being allowed to return back to sports play. The protocol used for this soccer athlete was the Brostrom repair for chronic ankle instability rehabilitation protocol.

0-3 weeks: The first 3 weeks post-surgical procedure the athlete was immobilized in a cast at 90 degrees, non-weight bearing, and progressed to pneumatic walker once most of the swelling went down. The athlete did toe curls, toe spreads and extension, and gentle foot movements once in a boot. Hip and knee strengthening exercises were began.

3-6 weeks: The athlete progresses to full weight bearing while in the walking boot. The athlete was immobilized for sleep until week 4 and was then allowed to sleep in an Aircast splint for weeks 4-6. Athlete began isometrics in multiple planes and progress to active exercises in protected ranges, proprioception exercises, intrinsic muscle strengthening, manual resisted exercises. Soft tissue treatments daily, cross friction, massages on scars, and regular mobilization of intermetatarsal and midtarsal joints. Cautious with talocrural and subtalar mobilization. Cycling, aerobic machines in splint as tolerated, and pool workouts in splint.

6-8 weeks: The athlete is going to start progressive weight bearing as tolerated with the walking boot and crutches as needed. Progression to normalizing gait with to discontinue the boot. Continuation of joint mobilization and edema control. Worked on ROM of dorsiflexion and plantarflexion. Inversion continued to be limited and eversion should be pain-free against gravity by the end of 8 weeks.

8-12 weeks: The athlete is going to restore FROM by the end of week 12, his gait will be pain-free, no edema post-activity, and 5/5 strength of all ankle muscle groups. AROM of inversion can be begun at week 9. Major strengthening with proprioception exercises are began in this phase. By week 11 if pain-free with 10 repetitions, the athlete can begin plyometric exercises with bilateral and unilateral jumps. Progression to jogging begins during this phase as well.

12- 24 weeks: The athlete can begin progression from a jog to a run. The goal of this phase is to build up the athlete's endurance, be at or close to full strength, continue improving proprioception, increase intensity of plyometrics, begin return to sports functional progressions and testing. For the next six months, the athlete is to continue wearing the lace up ankle brace during athletics to help support and protect the ankle from reinjury.

Return to play criteria:

First, this athlete must be able to perform a skill set of functional progressions and clinical testing. These include:

Retro jog, side shuffles, carioca, bilateral bounding (A-P then lateral), run, unilateral quadrant jumps, jog-sprint-jog, sprint-jog, sprint-stop, figure eights, unilateral bounding (A-P then lateral), 45-degree cuts, single-leg hop test for time and distance, multiple Hop Test, 90-degree cuts, and shuttle run test. Once the athlete is able to complete these, the athlete must begin performing single skill activities and then progress to multitasking skills and changing of directions. Once the athlete is able to perform these tasks, the athlete must then be able to perform well with a defensive player playing against him during drills. Then progress to practice drills with the team, then scrimmage with the team then back to full play.

The athlete has to be able to perform running to sprinting, multiplane activities, regain full cardiovascular and muscular endurance, his strength must be ≥85% limb symmetry through functional testing, no apprehension with high level activity, and with direction changes, and confidence in ankle.

Discussion and Summary

Snapping peroneal tendons due to a superior retinaculum tear are very rare and frequently misdiagnosed. These injuries can occur in all sports that produce collision and high velocity forces that require a long recovery period. The colligate male soccer athlete tore his superior peroneal retinaculum during a soccer game due to another athlete slide tackling into the inside of his left ankle. This athlete was originally diagnosed with a lateral ankle sprain but upon further inspection when the athlete was not improving, he was diagnosed with a torn superior peroneal retinaculum. Due to conservative treatment not being having a high success rate, the athlete had peroneal retinaculum repair with groove deepening surgery. The rehabilitation process involves six months of intensive physical therapy. The athlete also had to go through a return to play protocol. There are many forms of surgery to fix this condition and none are proven superior over the other based on the few studies conducted. The superior retinaculum repair with groove deepening is gaining popularity though as the most common surgery performed. This surgical procedure has a high success rate with a low fail rate. Many athletes have reported that they have no residual pain or issues since surgery.

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