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Case Report

Posterior tibial tendon dislocation after a medial ankle sprain: a case report

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Abstract

Medial ankle sprains have a very low incidence (5% of ankle ligament injuries), and most of the time, the first structure involved is the deltoid ligament complex. However, other structures, such as the spring ligament, posterior tibial tendon, and flexor retinaculum, can also get damaged. A 32-year-old man who had an ankle sprain while performing sports activities showed magnetic resonance imaging findings compatible with a detachment of the flexor retinaculum and medial dislocation of the posterior tibial tendon. Surgical intervention was suggested to this patient; deepening of the medial retromalleolar groove and reattaching of the retinaculum were performed. It is very important to consider this rare injury after a medial ankle sprain and to think out of the box, not always assuming a deltoid ligament lesion.

Level of Evidence V; Therapeutic Studies; Expert Opinion.

Keywords: Posterior tibial tendon; Tendon injuries; Ankle injuries; Joint dislocations.

Introduction

Medial ankle sprains have a relatively low incidence, accounting for 5% of ankle ligamentous injuries. In this scenario, the deltoid ligament complex is the most frequently damaged structure[1]; however, clinically determining which structures are injured is not an easy task. Clinical diagnosis is often insufficient due to poorly specific symptoms, such as pain, swelling, tenderness, instability, and ecchymosis[2]. Within this scope, the intimate anatomic relationship between the spring ligament, the posterior tibial tendon (PTT), or the flexor retinaculum and the superficial layer of the medial collateral ligament warrant further evaluation[1].

The evaluation of the PTT and its synovial sheath is paramount, given that both structures can explain medial-sided ankle pain. In this context, a high suspicion index is required to search for injuries other than those typically described after a medial ankle sprain-traumatic PTT lesions range from tears to complete ruptures, associated or not to a flexor retinaculum disruption. If the latter occurs, the tendon will probably dislocate[2], which is infrequent and neglected in most cases, becoming a chronic dislocation[2].

Case description

This study was approved by the institution's ethics committee, and the patient was informed that data concerning the case would be submitted for publication, providing his consent.

A 32-year-old male patient presented with a history of a medial ankle sprain. Even though the patient could not recall the exact mechanism of the injury, he perceived a popping sensation elicited after the injury. His main symptoms were pain around the medial malleolus, ecchymosis, and swelling.

Under physical examination, the patient showed normal alignment of the lower limb and foot. We could identify a palpable cord on the medial aspect of the ankle joint, but neither active nor passive relocation was possible. Such cord

Study performed at the Clínica Universidad de los Andes, Santiago, Chile.

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was running during flexion-extension of the ankle and inversion of the foot, accomplishing the main function of the PTT, whose strength was considered normal. Nevertheless, the patient presented a full range of motion of the ankle joint but a limited, painful heel-rise test and subtalar motion. The patient was initially diagnosed with a medial ankle sprain and treated with a walking boot. Despite this initial treatment, symptoms persisted during the following week.

Normal weight-bearing radiographs were obtained. Magnetic resonance imaging (MRI) showed a low-grade deltoid ligament injury associated with detachment of the flexor retinaculum and medial luxation of the posterior tibial tendon (Figures 1 and 2), with moderate tenosynovitis and medial malleolar bone bruise.

With the patient in the supine position under regional anesthesia, hip rotated externally, and ischemia induction using a tourniquet, we performed a retromalleolar approach. We identified the flexor retinaculum detachment from the medial malleolus forming a false pouch with an intact PTT inside. Relocation of the tendon to the retromalleolar sulcus was possible but unstable due to an insufficient retinaculum.

The surgery goal was to relocate the tendon, restore a competent and functional flexor retinaculum, and deepen the shallow retromalleolar groove to avoid a recurrent dislocation. An approach similar to that applied in peroneal tendon dislocations was used in this case: we weakened the anterior wall of the sulcus by drilling it with increasing drill sizes. Then, we impacted the retromalleolar groove surface to deepen the groove and preserve the cartilage surface, allowing for a smoother tendon mobilization[3].

Finally, we reefed the remaining retinaculum using two anchors loaded with high-resistance sutures in the posterior border of the tibia. A 'pants-over-vest' repair of the retinaculum was performed to enhance the repair stability (Figures 3, 4, and 5).

Partial weight-bearing assisted by two crutches was allowed for one week. Antibiotic and venous thromboembolism prophylaxis were indicated for three and 30 days, respectively, and there were no complications or adverse outcomes.

After two weeks, stitches were removed, and rehabilitation began with progressive removal of the boot at four weeks.

The patient was asymptomatic at the one-year follow-up and after ten physiotherapy sessions. Clinical examination showed no signs of PTT instability. He was able to return to sports without contact at three months, satisfactorily taking part in such activities without any restriction at four months.

Discussion

Traumatic PTT luxation has a very low incidence during medial ankle sprain. Although clinical diagnosis is simple with

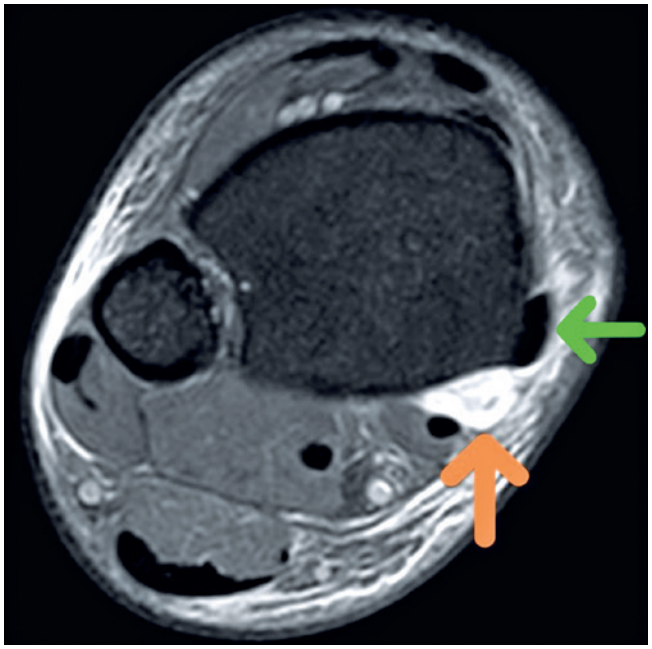

Figure 1. Axial MRI with the absence of the PTT in the retromalleolar groove associated with increased synovial fluid (orange arrow). Dislocated PTT location (green arrow).

Figure 2. Coronal MRI of the ankle showing the PTT presence (orange arrow) medial to the medial malleolus.

Figure 3. After the medial ankle approach, we could see the PTT dislocated out of the retromalleolar groove.

Figure 5. Retinaculum reefing after the PTT relocation into the retromalleolar groove.

Figure 4. Placement of two 3.5 anchors on the medial tibial side for retinaculum reattachment.

physical examination, it can be challenging due to the associated inflammation and a low suspicion index[2,4,5].

This injury rarely occurs as isolated lesions, being associated with an ankle fracture or a sports-related trauma in 58.5% of cases[4,5]. It was first described by Martins in 1874, and there are only a few case reports in the literature[5]. The complexity of this pathology lies in the nonspecific symptoms of a typical medial ankle sprain mechanism seen in the acute setting, with 53% of patients being misdiagnosed in the initial setting and a mean time to surgery of 17.3 weeks[5,6]. In a systematic review, 17 of 59 patients were initially treated for an ankle sprain, PTT dysfunction, or tarsal tunnel syndrome, and the mean delay in reaching the correct diagnosis was 4.4 ± 6.1 months[5].

Complications related to misdiagnosing and, thus, wrong treatment are a PTT unable to properly resist hindfoot eversion or a subtalar joint locking, directly leading to a dysfunctional gait that alters the foot biomechanics, recurrent dislocation, chronic pain, and poor functional results[7]. Also, a dislocated PTT can get damaged, leading to a tendon rupture[7].

Ouzounian et al.[8] reported seven patients with dislocation of the PTT, where six of them did not reach the correct diagnosis until nine months after injury.

The most common mechanism of injury is an involuntary, violent contraction of the PTT during dorsiflexion accompa-

nied by a forced inversion of the ankle[5,6]. Further, a relatively flat retromalleolar groove may predispose to dislocation[5].

Strydom classified these injuries into three categories: type 1 corresponds to an avulsion injury (most common and same as our patient), type 2 is a retinacular tear, and type 3 is related to a deficient retinacular tissue[6].

We confirmed our diagnosis by MRI and ultrasound. Magnetic resonance imaging shows specific findings in 75% of cases, compared to 14% of cases that could be detected by radiography, the latter being useful only to rule out medial malleolus fractures or avulsive lesions[5]. Ultrasound has 66% of specificity and is highly recommended for being a dynamic study that enables the elucidation of the non-anatomical position of the tendon through ankle mobilization[5].

Although we attempted a conservative treatment, literature has shown a very low success rate due to the obtainment of an insufficient retinaculum that is unable to retain the PTT in the retromalleolar groove. This is the main reason why the great majority of these injuries require surgical treatment (83%)[2].

Albeit several surgical techniques have been described, such as direct retinaculum repair, retinaculum reefing to the periosteum with anchors or intraosseous sutures, groove deepening or augmentation techniques with inverted periosteal flap, Achilles tendon flap, deltoid ligament flap, or sliding medial malleolus osteotomy, among others[6], there is no strong agreement on which is the best alternative for treating the luxation-options vary according to the state of the tendon, retinaculum, and retromalleolar groove[6]. We chose to treat the patient with the technique described above due to its simplicity and reproducibility.

Matsui et al.[9] reported a technique in which the pseudopouch was closed with suture tape and anchors. It showed beneficial results for cases of recurrent PTT dislocation, achieving a rigid fixation and a low profile implantation, with return to daily life and sports activities at 21 weeks.

In the presence of a partially torn and attenuated flexor retinaculum, Mullens et al[10]. proposed a plate buttressing technique for the flexor retinaculum associated with the closure of the potential space between the retinaculum and the periosteum[10]. They reported successful outcomes, with patients returning to preinjury levels of activity at one year. We consider this procedure to be much more aggressive than the one we offered to our patient, and that is the reason why it takes one year for patients to return to unpainfully physical activity, compared to four months as required by our patient.

Although the literature insists on long periods of immobilization with controlled ankle motion by walking boot or cast for approximately four weeks[4], we preferred early weight-bearing and rehabilitation to avoid calf atrophy and limited range of motion associated with ankle rigidity.

Limitations of this case report include its lack of generalizability and the danger of overinterpreting a single case, especially when it is a rare presentation of a common injury such as an ankle sprain.

Conclusão

The strength of this report is that, through a safe, reproducible, and reliable surgical technique of groove deepening associated with anchor flexor retinaculum reconstruction, we present a high-success solution to this unusual problem.

Medial ankle sprains require a systematic evaluation due to the associated injuries that can be undiagnosed, such as injuries of the retinaculum and posterior tibial dislocations.

Authors' contributions: Each author contributed individually and significantly to the development of this article: FMZ *(https://orcid.org/0000-0002-6520-9775). Conceived and planned the activities that led to the study, approved the final version, ARC *(https://orcid.org/0000-0002-3442-8342) Interpreted the results of the study, participated in the review process, and approved the final version; GLL* (https://orcid.org/0000-0003-3749-5345), and FCR *(https://orcid.org/0000-0002-3524-0624) and GCU *(https://orcid.org/0000-0002-1993-6250) Performed the surgery, data collection and approved the final version, have conceived and planned the activities that led to the paper; MPP* (https://orcid.org/0000-0002-2820-5337) and COM* (https://orcid.org/0000-0003-2574-9010) Bibliographic review, survey of the medical records, formatting of the article and participated in the reviewing process; and have approved the final. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

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