Bilateral Peroneal Tendon Subluxation Associated with Complex Hindfoot Fractures: A Case Report

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ABSTRACT

A 41-year-old man presented to the emergency department after crashing his dirt bike and sustaining bilateral subtalar fracture dislocations. The left talus underwent open reduction internal fixation. At his first postoperative visit, the patient was found to have bilateral peroneal tendon subluxation (PTS). This case report discusses the cause of PTS and the challenges associated with accurate identification and diagnosis of this injury. We review the diagnostic and therapeutic challenges associated with injury, the negative impact on clinical outcomes, and the association between PTS and hindfoot trauma.

Keywords: Peroneal Dislocation, Bilateral, Traumatic, Reconstruction

INTRODUCTION

The primary function of the peroneal tendons is to evert and plantarflex the ankle.[1] The peroneal tendons and superior retinaculum can be damaged when strong forces, such as a dirt-bike landing, cause the ankle to dorsiflex and invert suddenly. This motion causes the peroneus longus and brevis muscles of the lateral compartment of the leg to contract rapidly, resulting in injury to the superior retinaculum. The superior retinaculum helps stabilize the peroneal tendons and prevents them from subluxation. If chronic peroneal tendon subluxation (PTS) is left untreated, a patient can develop pain and snapping of the tendon over the lateral malleolus.[2] Wong-Chung et al[3] reported that PTS was missed on 53.0% of initial computerized tomography (CT) readings when patients presented with a calcaneus fracture. Swelling around the lateral malleolus can obscure the view of PTS, leading to inaccurate interpretations of the CT. Additionally, Wong-Chung et al identified the fleck sign as a useful indication for diagnosing PTS. Chauhan et al,[4] found that undiagnosed PTS led to potential chronic ankle instability requiring surgical treatment. They also describe the diagnostic utility of the fleck sign, nonsteroidal anti-inflammatory drugs, and swelling reduction methods being beneficial for the clinical detection of PTS while examining the ankle.

CASE REPORT

A 41-year-old man presented to the emergency department 4 hours after sustaining a bilateral ankle injury after crashing his dirt bike. He had concerns of right ankle numbness and noted that the right ankle hurt more than his left ankle. Initial radiographs and CT of the right foot and ankle showed a calcaneus fracture, lateral process talus fracture, and lateral malleolus avulsion fracture (Figures 1 and 2). Radiographs and CT findings of his left foot and ankle showed a calcaneus fracture, displaced talar neck fracture, fifth toe first proximal phalanx fracture, and lateral malleolus avulsion fracture (Figures 3 and 4).

The patient underwent closed treatment of his bilateral calcaneus fractures, right lateral malleolus fracture, and lateral talus process fractures. His left talar neck was treated with open reduction internal fixation after his soft tissue was amendable to surgical intervention and swelling had decreased.

At his first postoperative visit, the splint was removed, and the patient reported the right ankle “catching” with ankle motion. He had considerable swelling in both feet. The patient could flex and extend the great toe bilaterally, and he reported diffused full sensation with palpable pulses. The surgical incisions on the left ankle were healing well, and the sutures remained intact without evidence of complication. The patient had concerns about spasms of the right calf and clicking on the lateral aspect of the right ankle.

__Figure 1.__ A) Anteroposterior, B) mortise, and C) lateral ankle radiographs of the right ankle. The triangle shows distal fibula avulsion of superior peroneal retinaculum (fleck sign). The circle shows the lateral process of the talus fracture. The arrow shows fracture of the inferior calcaneus.

__Figure 2.__ A) Axial, B) sagittal, C) coronal, and D) expanded axial computer tomography cuts of the right ankle. The triangle shows peroneal tendons (brevis and longus) trapped between the distal fibula and the avulsed fragment. The circle shows the lateral process of the talus fracture. The arrow shows calcaneus fracture.

__Figure 3__. A) Anteroposterior (AP), B) mortise, and C) lateral ankle radiographs of the left ankle. D) AP radiograph of the left foot. The triangle arrow shows distal fibula avulsion of superior peroneal retinaculum (fleck sign). The circle shows a displaced talar neck fracture. The arrow shows calcaneus fracture. The ellipse shows a P1 fracture of the fifth toe.

__Figure 4.__ A) Axial, B) sagittal, C) coronal (posterior facet), and D) expanded axial computed tomography cuts of the left ankle. The triangle shows peroneal tendons (brevis and longus) trapped between distal fibula and avulsed fragment. Circle shows a talar neck fracture. The arrow shows a comminuted anterior calcaneus fracture.

__Figure 5.__ A) Anteroposterior, B) mortise, and C) lateral ankle radiographs of the right ankle. Two corkscrew anchors are present. The calcaneal and distal fibula fractures healed well.

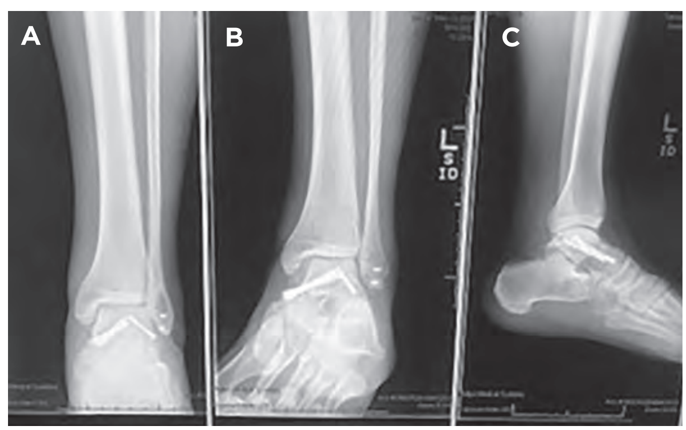

__Figure 6__. A) Anteroposterior, B) mortise, and C) lateral ankle radiographs of the left ankle. Two corkscrew anchors are seen. Hardware present without complication for the talar neck. Talus, calcaneus, and distal fibula fractures have healed well.

Re-examination of a previous bilateral lower extremity and ankle CT scan indicated entrapment with bilateral PTS of both the peroneal brevis and longus (Figures 2 and 4). Clinically, the right PTS was evident and painful, while the left remained asymptomatic. The treating surgeons made the decision to repair the bilateral PTS. The bilateral PTS fractures were likely an anatomic classification of type 4 superior retinacular tear. However, regardless of the classification, it was deemed necessary for the well being of the patient.

Approximately 2 weeks after the initial surgery, the patient returned to the operating room to treat bilateral PTS. On the right, the peroneal tendons were found within the fracture and were reduced without difficulty.

The doctors placed two 2.7-mm corkscrew anchors into the fibula and repaired the superior peroneal retinaculum. The peroneal tendons remained reduced. The same procedure was performed on the left ankle, which required a third radiolucent anchor to achieve sufficient tendon stability. Bilateral, short leg splints were applied with the feet in mild plantar flexion.

The patient returned for his 2-week postoperative visit without complications and was transitioned to walking boots at his 6-week visit. At his most recent visit, 6 months postoperatively, he was doing well overall. He had resolving paresthesia in his right medial plantar nerve distribution. He was weight bearing without considerable difficulty and had returned to work. We were not able to contact him for a final follow-up. The latest radiographs showed maintenance of the patient's reduction (Figures 5 and 6). He was overall satisfied with his function and pain.

DISCUSSION

Wong-Chung et al[3] evaluated patients presenting with calcaneus fractures and the subsequent relationship with PTS. The aim was to determine how peroneal tendon dislocation (PTD) could go unrecognized on initial CT imaging by both radiologists and orthopaedic surgeons. They found that 18 of 40 patients with PTD had swelling at the malleolar level. When 4 mm of swelling was measured on CT, the sensitivity was 100.0% and specificity was 21.8%. At 6 mm of swelling, sensitivity was 90.5% and specificity was 49.1%. At 11.5 mm, the sensitivity was 71.4% and specificity was 79.2%. The absence of lateral malleolus swelling decreased the likelihood of the patient having a PTD. Wong-Chung et al acknowledged that swelling makes it clinically difficult to diagnose subluxation, but a high index of suspicion should be maintained. They also reported that 14.0% of the calcaneus fractures (13 of 79) had a positive fleck sign.

Chauhan et al[4] recommend that while working up patients with suspected PTS, particularly with sports-related injuries, it's advisable to obtain anteroposterior, lateral, and mortise radiographs. Although these scans can yield ambiguous results, a small fleck seen on imaging, such as a fibula fragment, can be helpful in making a diagnosis. With a diagnostic test sensitivity of 0.31, specificity of 0.98, and a positive predictive value of 0.84, the fleck sign can indicate a PTS or PTD.[5] Furthermore, they suggest different imaging to assist in assessing for potential PTS. For example, when using ultrasound on a foot in a dorsiflexed and everted position, the peroneal tendon can be properly visualized. For our case, a CT scan with soft-tissue windows was diagnostic for PTS. VanPelt et al[6] reported another method using magnetic resonance imaging with kinetic assessment; however, it should not be the only imaging used to determine the need for corrective surgery in patients with PTS.

In conclusion, surgeons should maintain a high index of suspicion for PTS during traumatic injuries to the lower extremities. Although more obvious injuries may be present, such as a calcaneus fracture, there should be a high incidence of concurrent PTS, particularly in association with subtalar dislocation. For early diagnosis with associated fractures, reducing pain and swelling would be difficult, and other diagnostic methods would be preferable. The fleck sign has shown to be indicative of tears in the superior peroneal retinaculum. In this case, bilateral fleck signs and bilateral superior peroneal retinaculum tears that caused PTS were present. To provide the best long-term outcomes for the patient, surgeons should assume that PTS is indicated when a fleck sign is present until proven negative or treated accordingly.

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