

Case Report

Irreducible ankle fracture dislocation: a case report of posterior tibial tendon entrapment

Erica Marto^{1*}, Fernando Oliveira¹, Francisco Rodrigues¹,
Emanuel Cortesão de Seica^{2,3}, João Pedro Caetano¹

¹Department of Orthopaedics and Traumatology, Unidade Local de Saúde da Região de Leiria, Leiria, Portugal

²Department of Orthopaedics and Traumatology, Hospital Particular do Algarve, Gambelas, Portugal

³Department of Orthopaedics and Traumatology, Hospital da Luz, Lisboa, Portugal

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*Correspondence:

Dr. Erica Marto,

E-mail: martoerica@gmail.com

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ABSTRACT

Ankle fracture-dislocations are complex injuries that often involve displaced bones and significant soft tissue damage. In rare instances, the posterior tibial tendon can become incarcerated in the tibiofibular space, complicating standard reduction techniques. We present the case of a 61-year-old man who, eight weeks after a traffic accident, exhibited a Gustillo-Anderson IIIA open fracture-dislocation of the right ankle. Initial treatment involved wound debridement, external fixation, and fibular osteosynthesis. However, postoperative radiographs revealed persistent anterolateral displacement of the talus and widening of the medial clear space, necessitating further investigation. During definitive tibial fixation, the posterior tibial tendon, which had initially been missed, was found to be trapped between the tibia and fibula. Using an anteromedial approach, the tendon was successfully repositioned behind the medial malleolus. The patient experienced an uneventful recovery, achieving full ankle function and strength by 12 weeks, with stable fracture healing confirmed on radiographs. This case underscores the critical importance of early recognition of posterior tibial tendon entrapment in ankle fracture-dislocations, as delayed diagnosis can result in severe long-term complications.

Keywords: Ankle fracture, Ankle dislocation, Irreducible, Posterior tibial tendon, Tendon entrapment

INTRODUCTION

Ankle fracture-dislocations are among the most severe ankle injuries, often lacking specific treatment guidelines.¹⁻³ Rarely, displaced bony and soft tissue structures around the distal tibiofibular joint, such as anterior and posterior fibular dislocation, deltoid ligament incarceration, or tendon entrapment (e.g., extensor digitorum or posterior tibial tendon PTT), can obstruct reduction.^{2,4-9} In most cases of PTT dislocation, the tendon dislocates anteriorly over the medial malleolus through a ruptured flexor retinaculum.^{4,10-12} However, in rare instances, the PTT can become incarcerated within the tibiofibular space through a ruptured syndesmosis.^{4-6,12,13} This atypical positioning forces anterolateral talar subluxation and medial joint space widening, preventing

closed anatomical reduction.^{4,7,8,13,14} If undiagnosed, this condition can lead to significant functional instability, tendon damage, stiffness, arthritis, equinovarus deformity, and clawing of the first ray.^{3,4,10,12,14} Prompt recognition and early surgical intervention are crucial to prevent long-term complications and restore ankle function.^{2,5,10,14}

CASE REPORT

A 61-year-old man was transferred to our institution 8 weeks after sustaining an open fracture-dislocation of the right ankle in a traffic accident. Initial reports noted an 11 cm open wound with medial extrusion of the distal tibial plafond (Gustillo Anderson IIIA). Radiographs revealed a Denis-Weber C type fracture and a pronation-external rotation injury per Lauge-Hansen classification (Figure 1).

Urgent wound debridement and temporary stabilization with an external fixator were performed, followed by definitive osteosynthesis of the fibular fracture. Postoperative radiographs showed persistent anterolateral displacement of the talus and widening of the medial clear space (Figure 2). A later CT scan failed to detect posterior tibial tendon (PTT) entrapment. Revision surgery using an anteromedial approach revealed a complete rupture of the deltoid ligament and difficulty in reducing the tibiotalar joint. The PTT was found traversing from posterior to anterior between the tibiofibular interosseous space (Figure 3).



Figure 1: (A) Anteroposterior and (B) lateral radiographs after primary closed reduction at the emergency department with persistent anterolateral ankle joint dislocation.

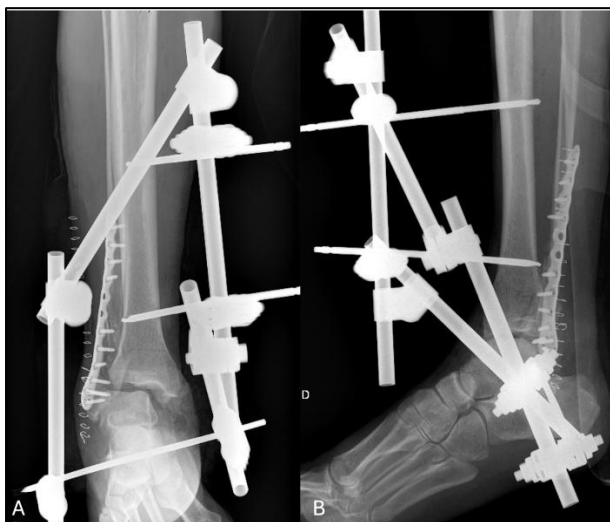


Figure 2: (A) Anteroposterior and (B) lateral radiographs after lateral fibular plate and temporary stabilization with an external fixator with a persistent anterolateral dislocation of the talus and widening of the medial clear space.

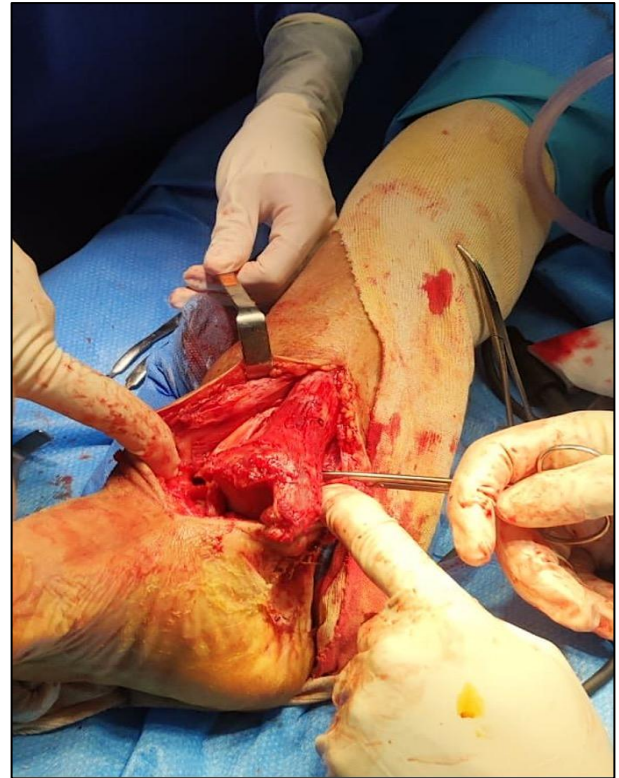


Figure 3: Intraoperative image showing the PTT traversing from posterior to anterior between the tibiofibular interosseous space.



Figure 4: (A) Anteroposterior and (B) lateral radiographs six weeks postoperatively show a correct ankle alignment.

Once repositioned behind the medial malleolus, minimal effort was required for tibiotalar reduction. Osteosynthesis of the fibula was revised, with concomitant stabilization of the syndesmosis. Additionally, repair of the flexor retinaculum and deltoid ligament reinsertion were performed. The patient was immobilized in a neutral position with a posterior splint and remained non-weight-bearing for 6 weeks. Radiographs confirmed maintained

alignment without hardware issues (Figure 4). At 12 weeks post-rehabilitation, he achieved full weight-bearing, 5/5 PTT strength, and complete ankle range of motion.

DISCUSSION

Irreducible ankle fracture-dislocations have been widely reported. However, only a few cases report PTT entrapment within the tibiofibular interosseous space.^{1-6,10-15} Several factors may contribute to the persistence of dislocation, including displaced bony and soft tissue structures surrounding the distal tibiofibular joint.^{2,4,5,7-9,15} Soft tissue involvement is often seen with the PTT and deltoid ligament, though less commonly, the flexor hallucis longus (FHL) tendon, flexor digitorum longus (FDL) tendon, and neurovascular bundle may also be involved.^{1-3,8,13-15}

PTT entrapment has been reported in different anatomical locations correlated with the amount of energy applied during the injury, ranging from the fracture site, either at the medial or posterior malleolus, anterior to the medial malleolus through a ruptured flexor retinaculum, to the interosseous space between the tibia and fibula.^{2-4,6,10,13,14}

Intraoperatively the tibiofibular syndesmosis and retromalleolar groove should be explored.^{1-3,5,6,14} CT analysis has proven to have diagnostic utility in confirming PTT displacement.^{3,4,12-15} Unfortunately, CT investigations may not detect all dislocations or tendon entrapment. If a PTT involvement is suspected, a stepwise analysis of the CT images using the soft tissue window is recommended.^{2,3} Magnetic resonance imaging (MRI) may also be considered for tendon and ligament injuries investigation. However, MRI is often less accessible in the acute traumatic setting.^{1-4,7,14}

Heini et al and Trividi et al both described cases of high-energy ankle fractures-dislocations showing persistent widening of syndesmosis and medial clear space after initial surgical procedure.^{13,15} In Heini's case, PTT entrapment in the tibiofibular interosseous space was diagnosed 8 months after the initial injury and the patient was submitted to PTT reduction through a Z-shape tenotomy and subsequent open reduction and internal fixation.¹⁵ Similarly, Trividi et al reported a Maisonneuve fracture-dislocation with PTT dislocation occurring through the syndesmosis, draping over the talar dome.¹³

Sato et al, reported a case in which recognition and reduction of the PTT incarceration was successful only after a third attempt at open reduction, 3 months after the initial surgery.¹² In this case, suspicion of persistent PTT dislocation arose due to the patient's reported difficulty in performing ankle inversion.

Most recently, Amaro et al described a case in which arthroscopic reduction of the tibialis posterior tendon was successfully performed.¹⁴ In the described case, the undiagnosed interposition of the PTT led to an irreducible

ankle syndesmosis. X-rays revealed a distal tibiofibular dislocation with syndesmotic diastasis, lateral subluxation of the talus and a widened medial clear space. Careful examination of the CT could have also confirmed PTT dislocation earlier.

In summary, when faced with a challenging or inadequate reduction of an ankle fracture, TTP interposition should be considered as a potential cause.^{1-6,9,12-14} Proper management and successful outcomes rely on an early diagnosis, careful intraoperative assessment and accurate surgical technique to address the interposed tissues.^{1-3,5,6,10,14} If misdiagnosed, it could lead to failed reductions, persistent pain, functional instability, tendon damage and dysfunction, as well as progressive arthritic changes.^{2-5,7,10,12,14-15}

CONCLUSION

This case highlights the crucial need to consider soft tissue interposition, particularly posterior tibial tendon incarceration, in cases of persistent ankle subluxation after high-energy fractures. Early recognition and intervention are essential, as missed diagnoses can lead to failed reductions, chronic instability, tendon dysfunction, and debilitating long-term complications.

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