

Case Report

Tibialis anterior tendon traumatic rupture secondary to a closed talar neck fracture: A case report[☆]



Ioannis V. Papachristos*, Rakesh B. Dalal

Stepping Hill Hospital, Stockport NHS Foundation Trust, Poplar Grove, Stockport SK2 7JE, United Kingdom

ARTICLE INFO

Keywords:

Tibialis anterior
Tendon
Rupture
Talar fracture
Complication

ABSTRACT

A case of a 22 year-old woman who sustained a closed Hawkins type II talar neck fracture after her left foot was caught in a rope while rock climbing outdoors is described. She presented to emergency department with a swollen and neurovascularly intact foot and a displaced talar neck fracture was identified. Intraoperatively a traumatic rupture of tibialis anterior tendon was found and was primarily repaired after the talar fixation. Revisiting the mechanism of injury it was evident that the jagged fracture ends ruptured the tibialis anterior tendon while she was hanging upside down on the strapping with the foot in forced equinus. This is the first case of such complication associated with a talar fracture and signifies the importance of tibialis anterior examination in such fractures.

1. Introduction

Talar neck fractures account for 50% of all talar fractures and represent fewer than 1% of all foot and ankle fractures [1]. They are usually high energy injuries caused by forced dorsiflexion with axial load. Subcutaneous traumatic rupture of tibialis anterior is a rare entity and is usually the result of forced plantarflexion under resistance [2]. Spontaneous ruptures are more frequent than true acute traumatic ones and usually occur in elderly patients as a sequelae of a metabolic disorder like diabetes mellitus, hypothyroidism, gout, psoriasis or secondary to a steroid injection [3]. As such, the case of a talar neck fracture in a young female associated with an acute tibialis anterior tendon rupture is described. This complication has not been reported in the literature so far.

2. Case report

A 22 year-old fit and healthy woman lost balance in September 2018 while rock climbing outdoors and her left foot was caught and twisted in a rope leaving her hanging in the air. She was rescued but her ankle was swollen and painful unable to weightbear. Upon presentation in the emergency department she was stable and her leg was well perfused with a swollen but otherwise neurovascularly intact left ankle. Plain radiographic imaging showed a talar neck fracture (Fig. 1) which was reduced and put in below knee backslab. Further radiological

evaluation with CT confirmed a displaced and comminuted Hawkins type II talar neck fracture. Operative treatment routinely started with the patient supine using a thigh tourniquet and a sandbag under the ipsilateral buttock. Anteromedial approach to the talus revealed a ruptured tibialis anterior tendon at the level of the talar fracture with one of the stumps retracted proximally which had to be retrieved by proximal dissection. (Fig. 2a). Both stumps had healthy edges and were stay-sutured for later repair. Talar neck fracture was comminuted with displaced and rotated talar head (Fig. 2b). We reduced and fixed it with three Asnis III (Stryker) 4 mm cannulated screws (Fig. 3). Satisfactory final talar fixation was checked in image intensifier and tibialis anterior tendon was then primarily end-to-end repaired using 3-0 PDS suture. Rest of tissues and skin were closed by standard fashion and ankle was put in below knee cast. Postoperative xrays confirmed the fixation (Fig. 4) and patient remained non-weightbearing for 6 weeks transitioning to partial weight bearing up to 12 weeks. Three months post-operatively she had almost full range of ankle movement and anterior tibialis tendon was strong and fully functioning (Fig. 5).

3. Discussion

Closed rupture of the tibialis anterior tendon is rare and has been firstly described by Brüning in Germany in 1905 [4]. In the English literature it was first described with the report of 2 cases by Burman in New York in 1934 one of which was chronic and was conservatively

[☆] This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

* Corresponding author.

E-mail addresses: ioannispapachristos@gmail.com (I.V. Papachristos), rdalal7119@aol.com (R.B. Dalal).



Fig. 1. (a) AP view of the ankle showing the talar neck fracture, (b) lateral view.

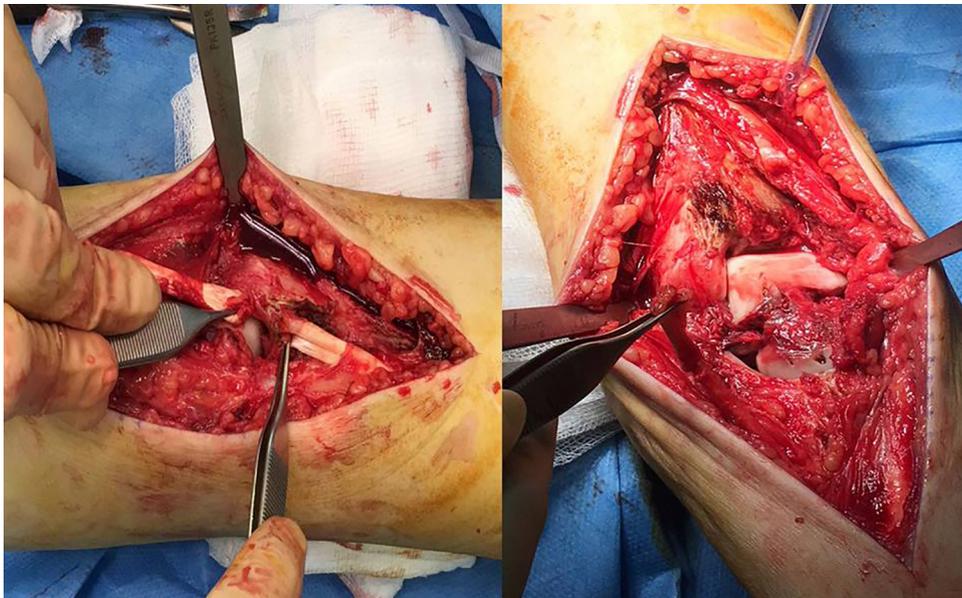


Fig. 2. (a) Anterior tibialis is torn at level of talus and stumps held with forceps, (b) comminuted fracture with rotated head.

treated and the other acute traumatic and was treated with primary repair [5]. Tibialis anterior ruptures can occur spontaneously without or with minimal trauma or as a result of penetrating or blunt trauma. The first category consists the vast majority and its pathophysiologic basis lies on chronic inflammatory or fibrotic changes that the tendinopathic tendon exhibits as in gout, psoriasis, rheumatoid arthritis, systemic lupus erythematosus, diabetes or chronic steroid use [3,6,7].

In such cases rupture usually occurs in the midsubstance of the tendon and a hypovascular zone of 45 to 67 mm in length in the anterior half of the tibialis anterior tendon has been identified [8]. Traumatic ruptures of tibialis anterior tendon are even rarer and they are usually the result of direct penetrating or blunt trauma. In closed trauma the mechanism of injury involves forceful and abrupt movement

in opposite direction of its action, mainly plantarflexion under resistance.

Traumatic tibialis anterior tendon rupture in combination or as a result of bony fracture is extremely rare and only limited reports can be found in the literature. Avulsion fracture of base of 1st metatarsal and medial cuneiform was reported in combination with tibialis anterior rupture and it was directly repaired with anchors in the first metatarsal [9]. Five reports of tibial fractures associated with closed tibialis anterior tendon ruptures can be found in the literature. The first of them in 1976 described 3 cases of distal tibial nonunion caused by the entrapment of anterior tibialis tendon in the fracture site [10]. Entrapment of the tendon in the tibial fracture site after avulsion from its distal insertion was also reported by Mechrefe et al. [11]. Direct

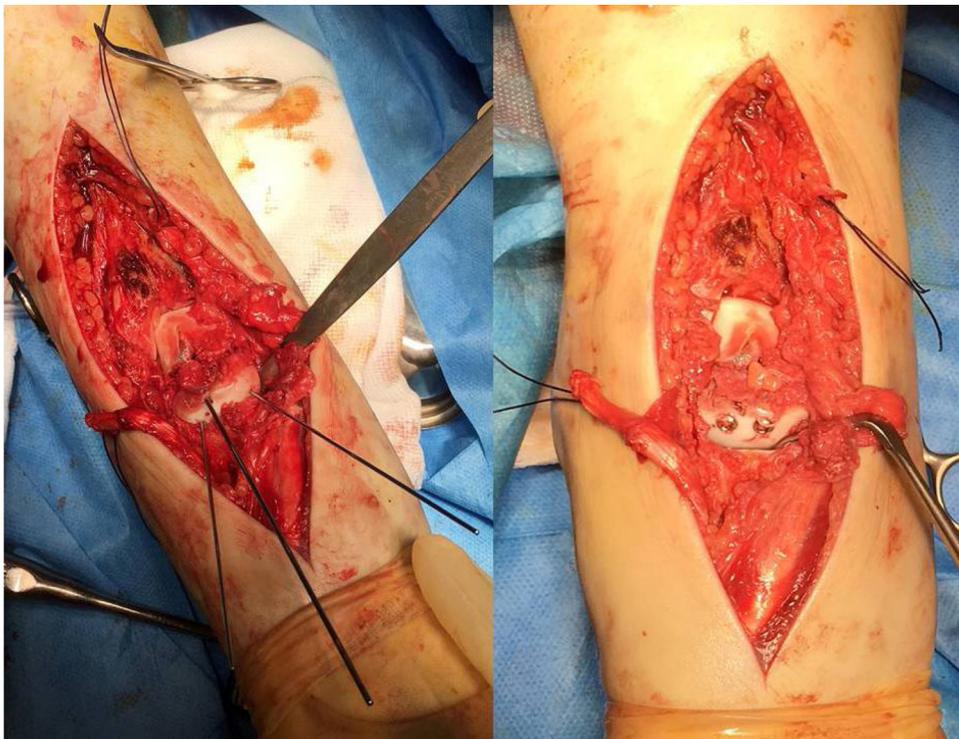


Fig. 3. (a) Reduction and k-wires, (b) fixation with 4 mm Asnis III cannulated screws. Tendon stumps ready for repair.



Fig. 4. Postop xrays. (a) AP, (b) lateral.

laceration of the tendon by the tibial fracture was reported in the rest three papers [12–14] but in only one was depicted at the time of skeletal stabilization and therefore primarily repaired [14]. One report was only identified in the literature describing a talar fracture with rupture of anterior tibialis tendon [15]. This was the case of a young male sustaining a motorbike crush injury resulting in an open Gustillo grade IIIB open talar neck fracture with undisplaced calcaneal fracture, dorsalis pedis laceration and rupture of tibialis anterior and extensor

hallucis longus tendons. Talar neck fracture was subjected to open reduction and internal fixation, tendons were debrided and repaired primarily and calcaneal fracture was treated conservatively. However this was a high-energy crush injury resulting in an open fracture as well as arterial laceration and rupture of the two tendons in the affected area; therefore the tibialis anterior rupture can be deemed as result of the direct open trauma rather than as a result of the talar fracture.

In the present case reported above, the patients foot was broken by



Fig. 5. Three months post-op full range of motion with strong tibialis anterior function.

the foot getting caught in a climbing rope. It is our believe that the forced dorsiflexion of the foot in the earlier part of the fall caused the Talar neck fracture with displacement and that the prolonged pressure contact of the Tibialis Anterior tendon against the jagged fracture edges caused the tendon to lacerate and rupture over a period of time, whilst the patient was waiting to be rescued. This is correlated by the findings at surgery, including the level of the rupture. There is only one published systematic review of subcutaneous tibialis anterior tendon ruptures including 85 cases suggesting that operative repair should be the chosen treatment in young and active population yielding excellent results [16]. Primary repair should always be the target whereas conservative management should be reserved for unfit for surgery or elderly and inactive population. In our case the tendon laceration could not be diagnosed preoperatively due to local swelling and pain therefore it was only discovered intraoperatively through the approach for talar fixation. However it is hard to predict if this injury could have been detected at that time of operation in case a different approach was used or in a different type of fracture. Therefore it is advised that examination of tibialis anterior is incorporated in the routine examination of a talar fracture. In summary, a rare case of a closed talar neck fracture resulting in tibialis anterior tendon rupture is presented. This pattern has never been described before therefore surgeons are advised to always be vigilant to investigate tibialis anterior integrity as part of routine examination in cases of talar fracture.

Declarations of interest

None.

Acknowledgements

None.

References

- [1] Ahmad J, Raikin SM. Current concepts review: talar fractures. *Foot Ankle Int* 2006;27(June (6)):475–82.
- [2] Kausch T, Rütt J. Subcutaneous rupture of the tibialis anterior tendon: review of the literature and a case report. *Arch Orthop Trauma Surg* 1998;117(4–5):290–3.
- [3] Patten A, Pun WK. Spontaneous rupture of the tibialis anterior tendon: a case report and literature review. *Foot Ankle Int* 2000;21:697–700.
- [4] Brüning E. Zwei seltene Fälle von subkutaner Sehnenzerreissung. *Münch Med Wochenschr* 1905;52:1928–30.
- [5] Burman MS. Subcutaneous rupture of the tendon of the tibialis anticus. *Ann Surg* 1934;100(August (2)):368–72.
- [6] DiDomenico LA, Williams K, Petrolia AF. Spontaneous rupture of the anterior tibial tendon in a diabetic patient: results of operative treatment. *J Foot Ankle Surg* 2008;47(September–October (5)):463–7. <https://doi.org/10.1053/j.jfas.2008.05.007>. Epub 2008 July 18.
- [7] Aydingoz U, Aydingoz O. Spontaneous rupture of the tibialis anterior tendon in a patient with psoriasis. *Clin Imaging* 2002;26:209–11.
- [8] Petersen W, Stein V, Tillman B. Blood supply of the tibialis anterior tendon. *Arch Orthop Trauma Surg* 1999;119:371–5.
- [9] Rajeev A, McDonald M, Newby M, Patterson P. Traumatic avulsion of tibialis anterior following an industrial accident: a case report. *Int J Surg Case Rep* 2015;14:125–8. <https://doi.org/10.1016/j.ijscr.2015.06.043>. Epub 2015 July 31.
- [10] Pho RW, Braidwood AS. Entrapment of the tibialis anterior tendon as a cause of

- nonunion in fractures of the distal tibia. *J Trauma* 1976;16(February (2)):95–8.
- [11] Mechrefe AP, Walsh EF, DiGiovanni CW. Anterior tibial tendon avulsion with distal tibial fracture entrapment: case report. *Foot Ankle Int* 2006;27:645–7.
- [12] Mirza MA, Korber KE. Isolated rupture of the tibialis anterior tendon associated with a fracture of the tibial shaft: a case report. *Orthopedics* 1984;7(August (8)):1329–32. <https://doi.org/10.3928/0147-7447-19840801-16>.
- [13] Din R, Therkilsden L. Rupture of tibialis anterior associated with a closed midshaft tibial fracture. *J Accid Emerg Med* 1999;16(November (6)):459.
- [14] Givissis P, Christodoulou A, Karataglis D, Terzidis I, Pournaras J. Laceration of tibialis anterior tendon complicating a closed tibial fracture: a case report. *J Foot Ankle Surg* 2004;43(November–December (6)):426–9.
- [15] Lancaster S, Harries W. Chance fracture of the talus and calcaneum. *J Foot Ankle Surg* 2013;52(May–June (3)):364–6. <https://doi.org/10.1053/j.jfas.2013.02.008>.
- [16] Christman-Skieller C, Merz MK, Tansey JP. A systematic review of tibialis anterior tendon rupture treatments and outcomes. *Am J Orthop (Belle Mead NJ)* 2015;44(April (4)):E94–9.