

# Laceration of Tibialis Anterior Tendon Complicating a Closed Tibial Fracture: A Case Report

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*Traumatic laceration of the tibialis anterior tendon complicating a closed tibial shaft fracture is a rare injury pattern. Only 3 such cases have been reported to date in the English literature and all were missed on initial examination. A case of a 17-year-old motorcyclist with an acute laceration of the tibialis anterior tendon resulting from a closed oblique tibial shaft fracture is presented. The tendon laceration was suspected preoperatively because of the patient's inability to actively dorsiflex his ankle joint and the existence of a palpable gap in the soft tissues over the anterolateral aspect of his tibia. Tibialis anterior tendon repair was performed simultaneously with fracture fixation. The role of careful physical examination is stressed so that this rare injury combination will not be missed. (The Journal of Foot & Ankle Surgery 43(6):426-429, 2004)*

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Acute rupture of the tibialis anterior tendon is a very rare injury. It is usually associated with minor trauma and occurs in patients older than 45 years of age who are suffering from diabetes mellitus, hypothyroidism, gout, or psoriasis or after a local steroid injection (1–7). However, to our knowledge, only 3 cases of acute traumatic laceration of the tibialis anterior tendon after a closed tibial fracture have been reported in the English literature (8–10). All 3 cases were not diagnosed on initial examination, and the fracture was managed either surgically or nonsurgically. The traumatic laceration of the tibialis anterior tendon was suspected only on follow-up examination, 2 weeks to 11 months after injury, when the patient's inability to actively dorsiflex the ankle joint became apparent.

The purpose of this case report is to present a case of acute traumatic laceration of the tibialis anterior tendon complicating a closed tibial fracture in a motorcyclist that was suspected preoperatively and was treated simultaneously with the fracture.

## Case Report

A 17-year-old motorcyclist was transferred to the accident and emergency department after a fall during a motocross race. He slipped and fell sideways, sustaining a twisting injury to his right leg as it became entrapped between his motorbike and the ground. The leg was painful and deformed. No neurovascular damage was noted and there were no clinical signs of a compartment syndrome present. The patient was unable to actively dorsiflex his right ankle, whereas active dorsiflexion of his toes could be performed.

Careful physical examination determined a palpable gap in the soft tissues over the anterolateral aspect of the lower third of his right tibia. Plain radiographs showed an oblique fracture at the junction of the middle and distal third of his tibia, extending from proximal-medial to distal-lateral (Fig 1). The palpable gap in the soft tissues and his inability to actively dorsiflex his right ankle led us to strongly suspect that the tibialis anterior tendon was acutely injured from the bony spike or was entrapped within the fracture site.

Open reduction and internal fixation of the fracture was chosen to simultaneously explore the tibialis anterior tendon. The fracture site was exposed via an incision over the anteromedial aspect of the distal half of the tibia. The fracture line was noted to course obliquely from proximal-medial to distal-lateral, and a proximal anterior bony spike was present. The tendon of the tibialis anterior was found lacerated at the same level with its stumps cleanly severed, apparently by the proximal anterior bone spike (Fig 2). Both

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**FIGURE 1** Preoperative anteroposterior and lateral views showing an oblique fracture of the middle and distal third of the tibia. The fibula is also fractured.

the extensor hallucis longus and the extensor digitorum longus were found to be intact.

The fracture was reduced and plated with a limited-contact dynamic compression plate (LC-DCP; Synthes, Paoli, PA) titanium plate and 9 screws, and the tendon was subsequently sutured with a modified Kessler stitch and reinforced by interrupted epitendinous polypropylene sutures (Fig 3). The tendon sheath was repaired with interrupted absorbable sutures; the fascia was closed over a drain and the skin was closed by using a Donati-Allgower stitch with its subcutaneous component on the medial side. Intravenous antibiotics were administered for 48 hours perioperatively and low-molecular-weight heparin was administered for 6 weeks postoperatively for thromboprophylaxis. The leg was immobilized in a below-knee posterior splint, with the ankle joint maintained at 90°, for 6 weeks. The patient began partial weightbearing and physiotherapy after removal of the posterior splint. By 3 months postoperatively, he had achieved full active dorsiflexion of his right ankle. On the final follow-up evaluation 3 years postoperatively, the patient showed full active dorsiflexion and plantarflexion of his ankle, very good power, and walked with a normal gait. At that time, the hardware was removed and the tibialis anterior tendon was completely healed with full restoration of its substance.

## Discussion

Acute closed rupture of the tendon of tibialis anterior is an infrequent entity (3–7). The vast majority of tibialis anterior tendon ruptures occur through the midsubstance of the tendon after minor trauma. These ruptures are secondary

to chronic inflammatory changes and fibrosis in pathologic conditions, such as rheumatoid arthritis, myositis, diabetes mellitus, hyperparathyroidism, hypothyroidism, psoriasis, gout, or history of local steroid injection (1–3, 5–7, 11, 12). The existence of a hypovascular zone has been proposed as a possible cause for this rupture. There is an avascular zone 45 to 67 mm in length in the anterior half of the tibialis anterior tendon, and this is the most frequent site of spontaneous ruptures of the tibialis anterior tendon (13).

Traumatic laceration of a previously normal tibialis anterior tendon complicating a closed tibial fracture is even more rare. In the 3 known cases that have been reported in the English literature, it was difficult to differentiate if this was an acute laceration of the tendon or a rupture secondary to constant rubbing against the bone ends (8–10). In 2 of the cases, the fractures were treated initially with a long-leg plaster cast, whereas the other was treated with an interlocking tibial nail. In the latter case, although the author discovered the complication 2 weeks postoperatively, details of the final outcome were



**FIGURE 2** Intraoperative photograph of the open reduction and internal fixation of the fracture. Note the cleanly severed ends of the anterior tibialis tendon.



**FIGURE 3** Intraoperative view showing the final treatment: the fracture is plated and the tendon is repaired.

not provided (8). However, the anterior tibial tendon was found ruptured during the surgical exploration for the soft tissue defect over the tibia (8). Of the 2 patients treated with a cast, 1 underwent a tendon reconstruction 11 months after injury and required aggressive physical therapy to correct the dorsiflexion deficit. The other patient was left with a residual equinus deformity. In both cases, the tendon of the tibialis anterior was found either ruptured near the fracture site with the 2 ends retracted and healed to callus and periosteum or degenerated and completely ruptured (9, 10).

The fracture pattern in each of these cases was similar: the fracture was located at the middle and distal third of the tibia, and was oblique in nature. Unlike our case, the anterior bone spike extended in a proximal-lateral to distal-medial direction, which is parallel to the line of

pull of the tibialis anterior tendon. In this fracture pattern, the tibialis anterior can be lacerated or entrapped between the two fragments, which may lead to fracture nonunion or disruption of the tendon, resulting in a residual equinus deformity if left untreated (10). According to the authors of the previous cases, the tendon laceration might be suspected from the radiographic appearance of the fracture pattern. One should proceed to either evaluate the tendon under aseptic conditions after the injection of local anesthetic at the fracture site or test ankle dorsiflexion against resistance and compare it with the uninjured side at initial presentation. Alternately, reevaluation of the patient after 6 to 8 weeks of plaster immobilization has been suggested (8–10).

Although examination of active ankle dorsiflexion in the presence of a tibial fracture is difficult, it is imperative. The absence of active dorsiflexion and a palpable tendon gap in the substance of the tibialis anterior tendon should arouse suspicion regarding this rare injury. We believe that this is the first reported case in which the tendon laceration was diagnosed and treated immediately along with the tibial fracture, allowing full functional restoration of power to the tibialis anterior and normal gait. The complex nature of this rare injury, necessitating open repair of the lacerated tibialis anterior tendon, led us to deviate from our usual treatment of an interlocking intramedullary nail for this type of fracture. We instead chose open reduction and fixation with a plate and screws to allow simultaneous repair of the lacerated tendon.

Early repair of tibialis anterior tendon rupture, especially in active young adults, is essential and leads to excellent results, as opposed to late or no repair, which may cause a severe functional deficit (2–4, 9). Marcarian et al (14) showed that nonsurgical treatment of such cases is only acceptable in ruptures occurring in elderly low-demand patients.

## Summary

Laceration of the tibialis anterior tendon complicating a closed tibial fracture is rare but should always be suspected in cases of oblique tibial fractures, especially when the fracture line is parallel to the line of pull of the tibialis anterior tendon. On physical examination, careful evaluation of the patient's ability to actively dorsiflex the ankle joint and evaluation for a palpable gap in the soft tissues of the anterior aspect of the lower third of the patient's leg is mandatory to diagnose this rare injury combination.

## References

1. Dooley BJ, Kudelka P, Menelaus MB. Subcutaneous rupture of the tendon of tibialis anterior. *J Bone Joint Surg* 62B:471–472, 1980.

2. Kashyap S, Prince R. Spontaneous rupture of the tibialis anterior tendon. A case report. *Clin Orthop* 216:159–161, 1987.
3. Patten A, Pun WK. Spontaneous rupture of the tibialis anterior tendon: a case report and literature review. *Foot Ankle Int* 21:697–700, 2000.
4. Trout BM, Hosey G, Wertheimer SJ. Rupture of the tibialis anterior tendon. *J Foot Ankle Surg* 39:54–58, 2000.
5. Otte S, Klinger HM, Lorenz F, Haerer T. Operative treatment in case of a closed rupture of the anterior tibial tendon. *Arch Orthop Trauma Surg* 122:189–190, 2001.
6. Aydingoz U, Aydingoz O. Spontaneous rupture of the tibialis anterior tendon in a patient with psoriasis. *Clin Imaging* 26:209–211, 2002.
7. Gallo RA, Kolman BH, Daffner RH, Sciulli RL, Roberts CC, DeMeo PJ. MRI of tibialis anterior tendon rupture. *Skeletal Radiol* 33:102–106, 2004.
8. Din R, Therakilsden L. Rupture of tibialis anterior associated with a closed midshaft tibial fracture. *J Accid Emerg Med* 16:459, 1999.
9. Mirza AM, Korber K. Isolated rupture of the tibialis anterior tendon associated with a fracture of the tibial shaft. A case report. *Orthopedics* 7:1329–1332, 1984.
10. Pho RWH, Braidwood AS. Entrapment of the tibialis anterior tendon as a cause of nonunion in fractures of the distal tibia. *J Trauma* 16:95–98, 1976.
11. Bianchi S, Zwass A, Abdelwahab I, Zoccola C. Evaluation of tibialis anterior tendon rupture by ultrasonography. *J Clin Ultrasound* 22:564–566, 1994.
12. Velan GJ, Hendel D. Degenerative tear of the tibialis anterior tendon after corticosteroid injection—augmentation with the extensor hallucis longus tendon, case report. *Acta Orthop Scand* 68:308–309, 1997.
13. Petersen W, Stein V, Tillman B. Blood supply of the tibialis anterior tendon. *Arch Orthop Trauma Surg* 119:371–375, 1999.
14. Marcarian GG, Kelikian AS, Brage M, Trainor T, Dias L. Anterior tibial tendon ruptures: an outcome analysis of operative versus non operative treatment. *Foot Ankle Int* 19:792–802, 1998.