



Sepsis as Complication After Closed Tendon Tibialis Anterior Rupture-Case Report

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Abstract

Tendon tibialis anterior (TTA) rupture, despite being the third most common tendon rupture of the lower extremity after Achilles and patellar tendon, is still rare [1]. There are relatively few cases of closed TTA ruptures reported in the literature [2]. We present a case report of a patient with unrecognized rupture of tendon tibialis anterior with complication of sepsis and surgical treatment of the TTA rupture with a semitendinosus tendon graft. In the literature there has been very few cases documented about TTA rupture after septic tenosynovitis, but none yet about complication of sepsis after the tendon tibialis anterior closed rupture [3].

Keywords: Tendon Tibialis Anterior Rupture; Sepsis; Semitendinosus Tendon Graft; Tendon Tibialis Anterior; Tendon Rupture; Surgery

Abbreviations

TTA: Tendon Tibialis Anterior; MRI: Magnetic Resonance Imaging

Introduction

Tibialis anterior muscle is the main dorsiflexor of the ankle. Originating from proximal half of the anterior tibia, the lower lateral tibial condyle, lateral tibia, and the interosseous membrane and inserting on the plantar medial side of the first cuneiform bone and the plantar base of the first metatarsal bone. The posterior surface of the tendon is well-vascularized while there is an important avascular zone where the tendon runs under the posterior and inferior retinacula. This is a risk area of 1 to 2 cm from the insertion that is prone to and the most common site of spontaneous rupture [2].

A mechanism for tendon tibialis anterior (TTA) rupture is forced or excessive plantar flexion while contracting the tibialis anterior

muscle. Rupture can be traumatic with direct or indirect trauma usually in young active patients or it can occur spontaneously due to degenerative changes which is more common in patient with accompanied diseases such as diabetes, gout, rheumatoid arthritis, systemic lupus erythematosus, hyperparathyroidism, psoriasis, corticosteroid treatment [1,4]. Spontaneous rupture can rarely be caused by constant microtrauma or is an exceptionally rare complication of septic tenosynovitis [5,3].

The most common symptom is a snapping sensation with a short episode of sharp pain over the dorsal site of the ankle followed by swelling [2]. On clinical examination there is typically a palpable defect, drop foot, pain and swelling in anterior ankle region, palpable mass, etc. A patient might notice a slapping gait, lack of coordination or difficulties walking [2]. Due to different complaints of patients on admission and not so common TTA rupture, it is often misdiagnosed or undiagnosed [6]. The reason

is also in agonist muscles extensor hallucis longus muscle and extensor digitorum muscle that help in dorsiflexion of the foot which conceal TTA dysfunction [5].

Diagnosis is based on clinical examination, while ultrasonography or MRI are confirmation methods [5].

We present a clinical case of tendon tibialis anterior rupture that complicated with sepsis after infection of surrounding hematoma and a surgical treatment of the rupture with a Semitendinosus tendon graft.

Case

A 54-year-old caucasian male with a history of alcohol abuse presented in emergency room with a swollen right foot and fever of 39°C. C-reactive protein was 297 mg/L and leucocytes were $22 \times 10^9/L$. With ultrasonography of the right foot deep venous thrombosis was excluded. Blood samples were positive for *S. Aureus*. Patient was treated for *S. Aureus* sepsis and received i.v. antibiotics flucloxaciline and piperacilline-tazobactam. He was first administered to the department of dermatology where he was actively treated for sepsis. Later on the patient was transferred to the department of surgical infections where treatment of sepsis continued and its later complications on cardiorespiratory system and thyroid hormones. While searching of origo of sepsis with abdominal ultrasound that excluded the origin, magnetic resonance imaging of the right foot showed abscess with fistules on the dorsal side, septic arthritis in 1st and 2nd tarsometatarsal joints, osteomyelitis of medial and middle cuneiform bones, suspected septic miozitis of lumbrical muscles of the foot and tenosinovitis with a rupture of tendon tibialis anterior. Later on we discovered he has a history of multiple injuries of the right foot and falling off the ladder a week before he came to the emergency room. Samples of the wound on the right foot also confirmed *S. Aureus* infection. During hospitalization he underwent a few procedures with drainage of the abscess and necrectomy. Intraoperatively a large hematoma was found around the rupture of TTA which was cleaned, segmentally resected infected 1st, 2nd and, intraoperatively discovered, also infected 3rd tarsometatarsal joints, and irrigated with solution of sodium hypochloride and Ringer's lactate and applied antibiotic-loaded beads. Destroyed branch of dorsalis pedis artery was also found which was ligated. At the medial side in the area of TTA rupture a vast matured hematoma was found

already partly colliquative. During the following procedure, negative pressure wound (NPWT) therapy was applied every five days. After eradicated local and systemic infection which was confirmed with laboratory findings, microbiology and histology, the patient was later treated with osteosynthesis of 1st, 2nd and 3rd metatarsal bones and bioactive glass. In the same procedure TTA reconstruction was made. An autograft of semitendinosus tendon was used with followed postoperative antibiotic prophylaxis with flucloxaciline. He was given a below-knee non-weight bearing cast for 6 weeks. After the last NPWT therapy ended, a soft tissue defect of the right foot was covered with a local flap and Thiersch graft by a plastic surgeon.

During hospitalization, after eradicated infection and reconstructive procedure, he was additionally treated with transcutaneous gaseous CO₂ therapy for improved healing of the tendon and surrounding soft tissue. After 2 months of treatments in the hospital he was discharged with the cast and crutches. After 5 months of physiotherapy the patient established independent walking without need of any aids. He was also regularly monitored at checkups every week for the first two months after discharge, then once monthly.



Figure 1: MRI of right ankle showing an abscess and rupture of TTA.



Figure 2 and 3: Intraoperative findings, TTA rupture with hematoma, previous incisions for abscess drainage are seen.



Figure 6: X-ray of right foot after osteosynthesis and below-knee non-weight bearing cast is seen.



Figure 4: Application of NPWT.



Figure 7: After completed NPWT therapy, clean wound granulation and soft tissue defect is seen. Soft tissue reconstruction by a plastic surgeon followed.



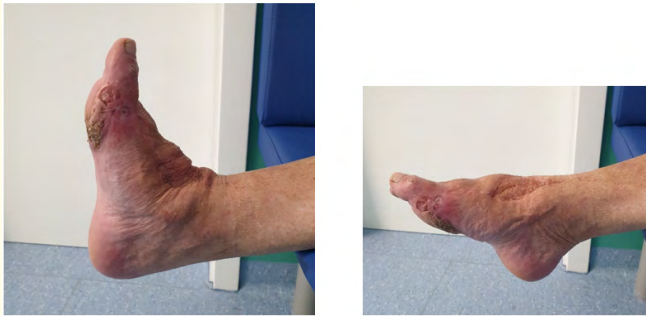
Figure 5: X-ray of the right foot after segmental resection of tarsometatarsal joints of 1st, 2nd and 3rd toes, application of antibiotic-loaded beads is seen.



Figure 8: Healed wound after soft tissue reconstruction.



Figures 9 and 10: After 2 years, healed wounds on the right foot and clinical condition.



Figures 11 and 12: Fully established mobility, dorsal flexion and plantar flexion.

Discussion

Our case report present an unusual origo of sepsis after a tendon tibialis anterior rupture. As Vrettakos A. et. al. in their article are reminding that TTA rupture should always be included in differential diagnosis of diminished foot dorsiflexion [9]. In our case the patient did not complain about any difficulties in dorsiflexion of the right foot, redirecting the focus of treatment solely to sepsis and associated symptoms.

Various treatment strategies are described in the literature with no general concensus for operative versus conservative treatment [6,7]. Nonsurgical treatment with orthosis and physical therapy is most appropriate for ruptures older than 3 months, in older patients with poorer mobility and accompanied diseases, low-demand or

sedentary patients, which purpose is to prevent further pronation the foot and to reduce the weak dorsiflexion force [5,7]. Surgical management is indicated in young active, high-demand patients and for patients who have failed nonoperative management [7]. The chronicity of the rupture should also be considered [7].

There are few different options for surgical techniques, including primary repair of the tendon, tendon transfer reconstruction, allograft reconstruction or free tendon autograft with grafts one of which is semitendinosus tendon [7].

We used a autologous semitendinosus tendon graft that in some our previous cases proved to be effective and showed good long-term results [5]. Tendon of semitendinosus muscle is suitable because of the similar diameters and properties as the tendon tibialis anterior and it can also be used for longer defects [5]. Good results of treating TTA rupture with Semitendinosus tendon also reported Michels M., *et al.* in their article as a reliable method [8].

We treated osteomyelitis of 1st, 2nd and 3rd TMT joint with resection and later, when the infection was eradicated, with arthrodesis of metatarsal bones and bioactive glass application. Ivanova et. al. presented a reliable possibility for treatment of bone infections caused by S.Aureus in biofilms with a bioactive glass [10]. Bioactive glass has also shown positive results in treatment of osteomyelitis as Korpar and Frangez reported in their case series [11]. There has been another retrospective observational study, otherwise in diabetic patients, about septic arthritis treatment with bioactive glass and positive outcomes [12].

After eradication of acute infection and sepsis folowed by reconstructive procedure with a semitendinosus graft he was also attending transcutaneous gaseous CO₂ therapy beneficial for healing of tendons and wounds due to its positive effects on microcirculation [13,14].

The patient's surgical treatment of osteomyelitis and TTA rupture ended with a successful outcome after application of below-knee non-weight bearing cast for six weeks and finished physiotherapy.

In addition sepsis and its complications were successfully treated during hospitalization. After treatment and physiotherapy of this unusual case was finished the patient gained an independent walking without any aids.

Despite the unusualness of this case and further complications the treatment methods that were used showed successful results.

Conclusion

We present a clinical case of a 45-year old patient with a fever and a swollen foot, which turned out to be due to sepsis caused by an infected hematoma in the ruptured tendon tibialis anterior (TTA). This is, to our knowledge, the first case documented in the literature.

Closed TTA ruptures are relatively rare, even rarer are following complications especially infection and development of sepsis. The results of our surgical treatment of the TTA rupture with a semitendinosus tendon autograft and surgical treatment of osteomyelitis also showed promising results with independent ambulation restored.

Moreover, this case highlights the possibility of a severe complication of, sometimes even missed symptoms, of injuries.

Conflict of Interest

The authors declare no conflict of interest.

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