

## CASE REPORT

## Tibialis Anterior Tendon Intrasubstance Tear Associated with Anterior Talofibular Ligament Tear: A Rare Encounter

MOHD YAZID B<sup>1</sup>, MUHAMMAD IMAN A<sup>1</sup>, ZUBAIR AS<sup>2</sup>, SARAH A<sup>1</sup>, IRFAN A<sup>1</sup>, MUHAMMAD SHAZWAN H<sup>1</sup>

<sup>1</sup>Department of Orthopaedics and Traumatology, <sup>2</sup>Department of Radiology, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia.

### ABSTRAK

Kecederaan di bahagian tendon tibialis anterior (TA) jarang berlaku jika dibandingkan dengan masalah tendon lain di bahagian kaki dan buku lali. Penerbitan tentang kecederaan TA tendon terutamanya kecederaan separuh koyak kurang dilaporkan. Sehingga ke hari ini, tiada penerbitan tentang kes kecederaan TA tendon yang berlaku serentak dengan kes kecederaan pada anterior talofibular ligament (ATFL). Kes ini berlaku pada lelaki berusia 22 tahun yang mengalami kecederaan pada bahagian buku lali akibat aktiviti sukan. Pengimejan resonans magnetik (MRI) menunjukkan TA tendon mempunyai separa putus serentak dengan putus pada ATFL. Kami meneruskan pembaikan terus tendon TA dan pembinaan semula ATFL ke atas pesakit ini dan telah menunjukkan respon yang baik. Skor pada "American Orthopaedic Foot and Ankle Score" (AOFAS) Ankle-Hindfoot adalah 86% pada bulan ketiga, 90% pada bulan keenam dan 96% pada tahun yang pertama selepas pembedahan. Koyakkan separa atau koyakkan memanjang dalam kecederaan TA tendon kebanyakannya disebabkan oleh TA tendinopati atau degenerasi. Diagnosis awal diikuti dengan pembedahan seperti pemulihan primer langsung, pemindahan tendon atau rekonstruksi tendon menunjukkan hasil yang baik.

*Kata kunci: kecederaan buku lali, kecederaan tendon, pemindahan tendon, tendinopati*

### ABSTRACT

Tibialis anterior (TA) tendon injury is an uncommon condition among other foot and ankle tendon pathology and there is insufficient literature on incomplete

**Address for correspondence and reprint requests:** Professor Dr. Mohd Yazid Bajuri. Department of Orthopaedics and Traumatology, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras, Kuala Lumpur, Malaysia. Tel: +603-9145 5555 Email: ezeds007@yahoo.com.my

or intrasubstance TA tendon tear. To date, no cases of TA tendon injury with concurrent anterior talofibular ligament (ATFL) tear has been documented. This is a rare case of a 22-year-old gentleman with ankle injury following sports activity and magnetic resonance imaging (MRI) ankle showed incomplete TA tendon tear with concurrent ATFL tear. We proceeded with TA tendon direct repair and ATFL reconstruction. Patient showed good recovery and at third months, sixth months and 1-year post-surgery, American Orthopaedic Foot and Ankle Score (AOFAS) Ankle-Hindfoot scores were 86%, 90% and 96%, respectively. In TA tendon injury, incomplete tear or longitudinal split is reported mostly due to TA tendinopathy or degeneration. Early diagnosis followed by surgical treatment is shown to give better results, which can be either direct primary repair, tendon transfer or tendon reconstruction.

Keywords: ankle injuries, tendinopathy, tendon injuries, tendon transfer

---

## INTRODUCTION

Tibialis anterior (TA) tendon injury is uncommon among other foot and ankle tendon pathology, and the diagnosis is often missed or delayed. It is also unusual to sustain an anterior talofibular ligament (ATFL) injury on the same occasion. Even though cases of TA rupture have been well reported, there are still very few literatures on incomplete or intrasubstance TA tendon tear (Grundt et al. 2010). Tibialis anterior originates from lateral condyle and upper two third of lateral surface tibia, interosseous membrane and deep fascia of intermuscular septum and it is inserted to medial plantar aspect of medial cuneiform and the adjoining first metatarsal bone. It serves as primary ankle dorsiflexors, as well as inversion of foot (Standing & Gray 2008). This paper reported a case of TA injury associated with anterior talofibular ligament injury and its presentation and management were

discussed.

## CASE REPORT

Patient is a 22-year-old gentleman who presented with left ankle pain for past four months that had progressively worsened. After two weeks of consultation, it worsened and interfered with his daily activities, affecting his ambulation and making him unable to walk. He was active in sport and used to play basketball with average of three times per week. He had multiple history of twisted ankle injury while playing basketball which previously resolved spontaneously until last four months when the pain become persistent and stopped him from being able to actively continue playing the sport. Upon examination, patient walked in antalgic gait, his ankle was diffusely swollen with mild tenderness over anterolateral and medial aspect with minimal ankle laxity. There was also a weakness

in ankle dorsiflexion but unable to appreciate any palpable gap as the ankle was diffusely swollen.

Plain ankle radiograph shows no significant finding. Magnetic resonance imaging (MRI) left ankle was done and revealed bony outgrowth over anteromedial aspect of the neck of talus with tenosynovitis of TA tendon and anterior ankle impingement (Figure 1). It also showed ATFL tear and ankle effusion (Figure 2).

Patient was treated with left TA tendon repair and left ATFL ligament reconstruction. Intraoperative, it was noted that there was longitudinal intrasubstance TA tendon tear with evidence of tenosynovitis along with a complete ATFL tear (Figure 3). The bony outgrowth observed in the MRI was excised as there was a risk that the sharp end of the growth can cause rupture of the TA tendon. Post-surgery, boot slab was applied, and physiotherapy started with strictly no

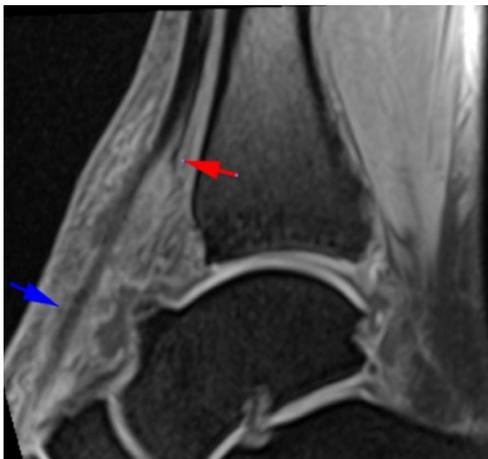


Figure 1: Sagittal T1 fat suppression image of the ankle showed tear of the TA tendon at the level of distal tibial (red arrow) with the remaining tendon exhibited high signal intensity (blue arrow) till its insertion to the navicular base.

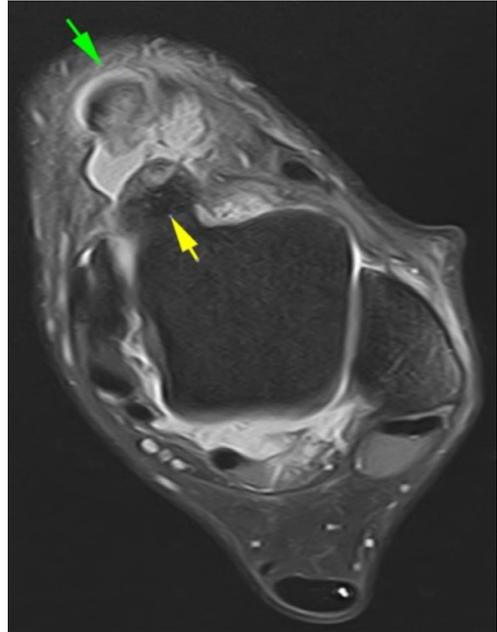


Figure 2: Axial proton density fat saturation image of the ankle showed high signal intensity of the anterior tibialis tendon (green arrow) with adjacent joint effusion and bony outgrowth arising from the talar neck (yellow arrow).

weight bearing for the initial six weeks, and subsequently he was allowed for full weight bearing after six weeks. There were no complications regarding the wound and the patient is making good progress in terms of pain relief and felt content to resume previous activity. At third months, sixth months and first year post-surgery assessment, patient scored 86%, 90% and 96%, respectively in American Orthopaedic Foot and Ankle Score (AOFAS) Ankle-Hindfoot score (Figure 4).

## DISCUSSION

Tibialis anterior tendon injury can be classified by either complete or partial rupture and acute or chronic. The less common incomplete rupture or

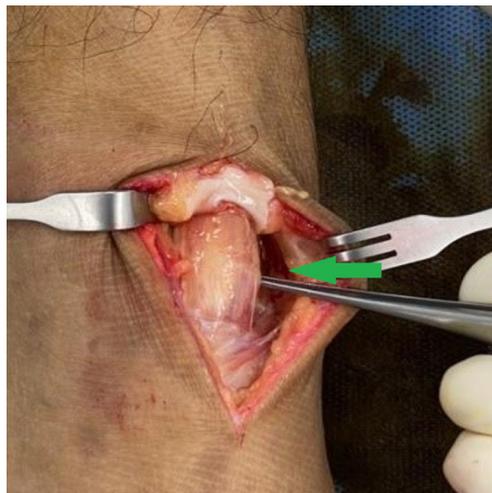


Figure 3: Intraoperative image of intrasubstance TA tendon tear

longitudinal split was reported mostly due to TA tendinopathy or degeneration (Vosoughi et al. 2020). Meanwhile, chronic rupture of the tendon is commonly associated with large segmental defect which warranted for a more complex surgical procedures other than a primary repair (Huh et al. 2015). It is important to identify the risk factors that may contribute to the injury such as inflammatory arthropathy, gout, diabetes mellitus and steroid

injections. This injury may occur due to trauma, which is observed more in younger age, while atraumatic cause of injury is commonly seen in elderly patients (Cignetti et al. 2019; Levitsky et al. 2020). An unusual case of TA tendon tear which is associated with medial malleolus fracture has also been reported (Başaran et al. 2018). All these risk factors should aid and increase our index of suspicion in diagnosing TA tendon injury. As tendon functions as an attachment point between muscle and bone, the common site of TA rupture is reported to be at 0.5 to 3.0 cm from its bony insertion or where the tendon passes underneath inferior extensor retinaculum (Looi et al. 2020). This is area is proposed to have poor vascularity as the dual blood supply to the tendon are from anterior tibial artery proximally and medial tarsal artery distally (Gwynne-Jones et al. 2009; Tickner et al. 2019).

Despite its rarity usually being attributed to the tendency to miss this injury, the secondary ankle dorsiflexion that provide compensatory assistance in ankle dorsiflexion may also mask the

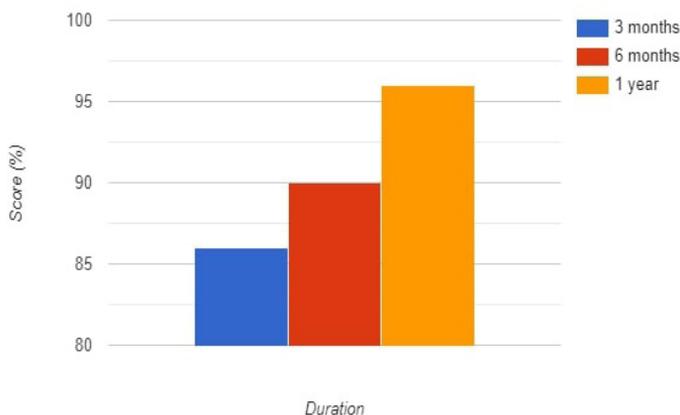


Figure 4: AOFAS Score for 3 months, 6 months and 1 year post-surgery

symptoms (Levitsky et al. 2020). Hence, it is important to be very vigilant in identifying the clinical manifestations to come to a right diagnosis. Signs and symptoms that may present varies from mild pain, weakness in ankle dorsiflexion, localised mass, or palpable gap (in case of complete rupture), point tenderness over TA insertion, unsteady or high stepping gait, and claw toes or gastrocnemius tightness in chronic cases (Grundy et al. 2010; Vosoughi et al. 2020). Magnetic resonance imaging is the gold standard in confirming the diagnosis. In center where MRI is not readily available or limited, ultrasonography is also effective, but it is operator dependent (Grundy et al. 2010; Safar et al. 2020).

Management is divided into surgery and conservative, although the latter is reserved for those who are in poor general condition and not a fit candidate for surgery or elderly with low physical demands (Moyer & Kosanovich 2002; Safar et al. 2020). Available options for surgical treatment include direct primary repair, tendon transfer and tendon reconstruction (Moyer & Kosanovich 2002; Safar et al. 2020). Grundy et al. (2010) stated in a case series of 11 patients (age ranged 42- to 75-year-old with mean age of 59) with incomplete TA tear who had failed conservative management, reported 75% good or excellent outcome following surgery. In this literature, No. 0 and No. 1 absorbable sutures (PDS II and Vicryl) were used to repair longitudinal split, supplemented with a Bio-Corkscrew™ suture anchor with No. 2 Fiberwire at the insertion of medial cuneiform when there is more

than 50% normal tendon remained post-debridement. In cases where only less than 50% of TA tendon remained, the extensor hallucis longus (EHL) transfer was done to augment the tendon. In TA tendon rupture, factors to be considered in deciding the surgical technique includes availability of the distal TA tendon stump, size of the tendon defect and duration from onset of injury (Cignetti et al. 2019; Moyer & Kosanovich 2002). It is reported that direct repair or repair with sliding lengthening TA tendon is possible in injury with tendon gap of 2 to 4 cm. However, when defect is more than 4 cm, free tendon autograft is needed (Cignetti et al. 2019). This is similar in chronic rupture when injury is more than three months, due to tissue necrosis and the severity of stump retraction, free tendon graft is more likely preferred than a direct primary repair. However, Cignetti et al. (2019) reported that it is not the same in the case of TA tendinosis where neither the length of tendinosed segment nor the duration of the disease is able to provide prediction on which is the better choice of surgery between direct primary repair or free tendon autograft. There have been various surgical procedures reported including sliding lengthening of TA tendon, tibialis posterior transfer, EHL transfer, extensor digitorum longus (EDL) graft, peroneus brevis graft, semitendinosus graft, gracilis graft, or kelikian procedure which transfers proximal extensor digitorum longus to the insertion of TA with the distal EDL tenodesis to extensor hallucis brevis (Gwynne-Jones et al. 2009; Tickner et al. 2019).

Among these surgical procedures, Tickner et al. (2019) reported the ipsilateral sliding lengthening of TA tendon, semitendinosus graft and direct repair are the procedures with potential good outcome compared to reconstruction with other tendon autografts. Moreover, worst result is seen in reconstruction with EHL which is possibly due to reduction in strength of another ankle dorsiflexor provided by EHL (Tickner et al. 2019). Another alternative in managing chronic TA tendon rupture is reconstruction with TA allograft which has shown satisfactory outcome, while allowing anatomic repair. It is safe and reduces risk of the donor site morbidity that associated with tendon transfer or autograft (Huh et al. 2015). Conservative management for TA rupture includes ankle foot orthosis, physiotherapy and activity modification, but this may lead to persistent abnormal gait and weakness dorsiflexion (Cignetti et al. 2019). Other reported complications include pain from retracted stump, heel cord contracture, flat foot deformity and claw and hammer toes (Gwynne-Jones et al. 2009). The indication for surgical repair for ATFL injury was positive in this case as this patient has positive drawer test and instability symptoms. In view of the findings and concomitant TA injury, surgical option is the best options as patient is young and active. The indication for surgical repair should always be made on an individual basis although there is a role of conservative treatment (Petersen et al. 2013).

## CONCLUSION

Tibialis anterior tendon injury, despite its rarity, needs to be detected and treated right away because a delay could lead to serious long-term consequences and morbidity. Even though the concomitant ATFL injury is rare, it can occur and surgical option has positive result. Moreover, early operative repair demonstrates good functional outcome as compared to conservative management, especially in young and active patient.

## REFERENCES

- Başaran, S., Sayit, E., Bayrak, A., Çelik, M. and Öneş, H. 2018. Closed fracture of the medial malleolus accompanied by a rupture of the tibialis anterior tendon: an unusual case report. *Med Bull Haseki* **56**(4): 333.
- Cignetti, C., Peng, J., McGee, A., Lehtonen, E., Abyar, E., Patel, H., He, J., Naranje, S., Shah, A. 2019. Tibialis anterior tendinosis: Clinical characterization and surgical treatment. *The Foot* **39**: 79-84.
- Grundy, J., O'Sullivan, R., Beischer, A. 2010. Operative management of distal tibialis anterior tendinopathy. *Foot Ankle Int* **31**(3): 212-9.
- Gwynne-Jones, D., Garneti, N., Wyatt, M. 2009. Closed tibialis anterior tendon rupture: a case series. *Foot Ankle Int* **30**(8): 758-62.
- Huh, J., Boyette, D., Parekh, S., Nunley, J. 2015. Allograft reconstruction of chronic tibialis anterior tendon ruptures. *Foot Ankle Int* **36**(10): 1180-9.
- Levitsky, M., Freibott, C., Greisberg, J., Vosseller, J. 2020. Risk Factors for Anterior Tibial Tendon Pathology. *Foot Ankle Int* **42**(3): 329-32.
- Looi, Q.H., Eng, S.P., Liao, L.L., Tor, Y.S., Bajuri, M.Y., Ng, M.H., Xian, J. 2020. Mesenchymal stem cell therapy for sports injuries-From research to clinical practice. *Sains Malays* **49**(4): 825-38.
- Moyer, J., Kosanovich, R. 2002. Anterior tibial tendon injuries. *Clin Podiatr Med Surg* **19**(3): 433-40.
- Petersen, W., Rembitzki, I.V., Koppenburg, A.G., Ellermann, A., Liebau, C., Brüggemann, G.P., Best, R. 2013. Treatment of acute ankle ligament injuries: a systematic review. *Arch Orthop Trauma Surg* **133**(8): 1129-41.
- Safar, A., Bath, O., Hernigou, J., Moest, E., Maes, R., Callewier, A. 2020. Surgical repair of a tibialis

- anterior tendon rupture: a case report. *Acta Orthop Belg* **86**: 697-701.
- Standring, S., Gray, H., 2008. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. 40th edition. New York: Elsevier Limited.
- Tickner, A., Thorng, S., Martin, M., Marmolejo, V. 2019. Management of Isolated Anterior Tibial Tendon Rupture: A Systematic Review and Meta-Analysis. *J Foot Ankle Surg* **58**(2): 213-20.
- Vosoughi, A., Heyes, G., Molloy, A., Mason, L. and Hoveidaei, A., 2020. Management of tibialis anterior tendon rupture. *Foot Ankle Surg* **26**(5): 487-93.

Received: 22 Feb 2022

Accepted: 25 Nov 2022