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Repair of the Tibialis Anterior Tendon Using a Semitendinosus Autograft: A Case Report

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ABSTRACT

The tibialis anterior tendon is the prime dorsiflexor of the ankle. Ruptures of this tendon are rare but can cause considerable functional deficits. Despite this, the literature on this lesion is sparse. Rupture of tibialis anterior tendon, although an infrequent entity to occur, using semitendinosus tendon as a donor graft aids to achieve admirable functional outcome. Large gaps resulting from tibialis anterior tendon ruptures can be successfully bridged with a free semitendinosus tendon graft and has low donor site morbidity.

Keywords: Tibialis anterior tendon, Pulvertaft technique, Semitendinosus Autograft, Tendon gap

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INTRODUCTION

A previously healthy 15 years old Male came to OPD with history of trauma due to road traffic accident 1 month ago when he had contused lacerated wound of 3 x 2 cm over anterior aspect of distal end of tibia 2 cm proximal to ankle joint. Immediately after injury, this wound was sutured by a local practitioner and no bony defect was noted on x-rays. He lacks active dorsiflexion of his foot since then.

On examination

A 3 x 1 cm scar of previous injury was seen with a swelling of 2x2 cm approximately 4 cm proximal to the scar. This soft subcutaneous and tender mass was along the tendon of tibialis anterior muscle. On palpation distal to the swelling, a palpable gap was noted.

- The passive range of movement at ankle joint were full and free with no neurological deficit. He had high stepping gait and he was unable to actively dorsiflex his foot.
- X-Ray of ankle joint and foot revealed no osseous abnormalities.
- Local ultrasound showed rupture of tibialis anterior tendon

Magnetic resonance image located the proximal end of tendon just at the level of superior extensor retinaculum with gap of 7.2 cm [Figure 1]

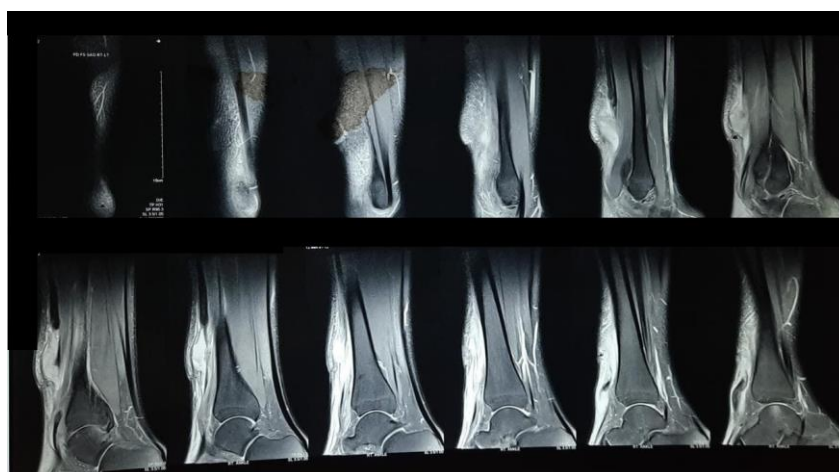


Figure 1: MRI Showing discontinuity in tendon

Operative technique:

Spinal Anaesthesia was administered, and the patient was positioned supine with knee flexed. Z shaped incision was made to incorporate previous transverse wound scar by extending longitudinally at both ends proximal as well distal to scar [Figure 2]



Figure 2: Z shaped incision to incorporate previous scar

The frayed tendon ends were debrided and freshened up at both ends. Defect of 7.2 cm was found after end-to-end approximation was attempted [Figure 3].



Figure 3: The frayed tendon ends with tendon gap of 7.2 cm

The semitendinosus tendon was harvested through a 3-cm incision medial to the tibial tuberosity using a tendon stripper. The length of the graft obtained was 19 cm. The semitendinosus tendon was prepared to use as tendon graft. Whip stitches were placed on a length of approximately 3 cm of the tendon on either end. While suturing the graft to recipient ends, care was taken to keep the ankle in the neutral position. Fish-mouth end-to-end suture of graft were taken using Pulvertaft technique ² to repair the tibialis anterior tendon. Smaller end of graft was brought through larger end of tibialis anterior tendon and anchored with one or two sutures after tension is adjusted. Graft is brought through more proximal hole and is anchored again to recipient site with one or two sutures after tension is adjusted. Excess of graft is trimmed. This so-called fish mouth is closed with sutures. The reconstruction was reinforced by placing multiple sutures at the entry and exit points of the soft-tissue tunnel in each stump to combine the Semitendinosus graft with the anterior tibial tendon. [Figure 4]



Figure 4: Semitendinosus tendon autograft sutured with Pulvertaft technique

Postoperative Care

Postoperatively, a below-knee plaster cast with the ankle in slight dorsiflexion was applied for 4 weeks with no weight bearing on operative side and below knee walking cast with gradual weight bearing for next 2 weeks. Range-of-motion exercise of the ankle joint, and intensive muscle training were advised after 6 weeks. Aggressive physiotherapy has helped to achieve complete functional recovery in 8 weeks [Figure 5] without any abnormalities in gait. At 2 months, regular shoes were worn and physical therapy continued. At 6 months, full activity was resumed.



Figure 5 : Functional outcome at 8 weeks postoperatively

DISCUSSION

Because of the rarity of the condition, there is no clear treatment algorithm for this condition. In the few published reports of Tibialis anterior tendon ruptures, EHL, EDL, and peroneus brevis transfers are the most frequently described options for Tibialis anterior tendon reconstruction.¹

The largest series of patients receiving operative treatment in the literature reports 19 TAT ruptures in 18 patients.10 Seven of these patients received a direct repair of the tendon and 12 had interposition tendon grafts, with 5 receiving a plantaris graft, 5 an EDL graft, 1 an Achilles graft, and 1 where both an Achilles and an EHL graft was used.10 This article did not explain the choice of donor tendon or any sort of treatment algorithm, highlighting the need for further investigation¹

Tendon transfers using the extensors of toes, free peroneus brevis tendon graft, and sliding graft of split anterior tibial tendon have been reported as reconstruction procedures.¹

For our patient, we chose an autogenous semitendinosus tendon as graft material. The semitendinosus tendon is one of the popular graft materials used routinely in knee ligament reconstruction surgery without major donor site morbidity.³

Use of a hamstring tendon as an interposition graft for a tibialis anterior tendon rupture has been described in series of case reports⁴

Use of the hamstring tendon offers several advantages³.

1. The diameter of this tendon corresponds to the diameter of the tibialis anterior tendon.
2. Because of its adequate length, longer gaps can be bridged easily.
3. Harvesting the semitendinosus tendon uses a common technique, and donor site morbidity is very low.

4. Surgery to the foot is limited to the tendon reconstruction, and the normal structure of the foot and ankle is not further affected.
5. Stable reconstruction with a strong, healthy tendon allows early mobilization and weight bearing.

Recently, in order to decrease the associated foot morbidity involved with local tendon transfers, several authors have described operative techniques that use hamstring grafts to reconstruct ruptured Tibialis anterior tendon. One study described using a semitendinosus autograft with a minimally invasive technique in 12 patients.⁵

The peroneus brevis, semitendinosus, gracilis, plantaris, EDL, and Achilles tendons have been applied as auto grafts for interposition autologous tendon grafting of the chronic tibialis anterior disruption with a large defect.⁴

However, in reconstructive surgery using autografts, a possible complication is adhesion between the reconstructed tibialis anterior tendon and the repaired extensor retinaculum that is incised in the reconstructive procedure.

CONCLUSION

Rupture of tibialis anterior tendon, although an infrequent entity to occur, using semitendinosus tendon as a donor graft aids to achieve admirable functional outcome. Large gaps resulting from tibialis anterior tendon ruptures can be successfully bridged with a free semitendinosus tendon graft. The repair using the double strand technique is strong, durable and has low donor side morbidity.

CONFLICT OF INTEREST:

The authors declare no conflict of interest in relation with this paper.

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Ethical Approval:

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