Tibialis Anterior Rupture/Repair and Reinforcement Using DermaSpan™ Acellular Dermal Matrix

Dr. John Torregrosa

Introduction

Tibialis anterior tendon ruptures are rare injuries that can lead to permanent impairment if not managed properly. There is an ongoing discussion in the literature regarding non-operative vs. operative treatment.

The tibialis anterior can rupture from external trauma, degeneration, or as a result of being strained beyond its capacity without any known pathological or external influence. The mechanism, which typically leads to rupture without obvious pathology or external trauma, is plantarflexion of the ankle by the triceps surae, overpowering the weaker tibialis anterior muscle, leading to a rupture. Although there is an associated increased complication rate with surgical treatment, non-surgical treatment is widely believed to have an increased re-rupture rate.[1]

There are a wide variety of repair techniques for tendons including a variety of suture techniques for end-to-end anastomosis, interposition tendon grafts, and augmented repair with the use of pliable biologic grafts, which increase tensile strength. The latter have grown in popularity because of their conformability to the injured site, mechanical properties, ability to incorporate and remodel with the host tissue, and minimal profile when applied to the repair site.

Case Study

A 40-year-old male suffered a work related injury in which a metal object fell off a roof onto his anterior lower leg. He suffered a 5 cm laceration superior to the ankle. The patient was treated and released from the emergency room after having the laceration repaired. The patient was then followed at a workers compensation clinic where he was treated conservatively for six weeks before being referred out. The patient stated that, although he noticed improvement, he experienced pain with forced plantarflexion or dorsiflexion of the ankle.

Physical Examination

Initial examination revealed pain with end range plantarflexion of the ankle and weakness in dorsiflexion when compared to the contralateral limb. There was a cicatrix measuring approximately 5 cm beginning less than 2 inches above the tibio-talar articulation in line with the tibialis anterior tendon. Herniation of soft tissue could be palpated under the skin with mild tenderness.

Pre–operative Work Up

An MRI was ordered which revealed a complete tear of the tibialis anterior tendon with a 3 cm fluid filled tendon gap. The proximal edge was noted 5.9 cm superior to the tibial plafond while the distal edge was 3 cm superior to the plafond. Mild fraying of the tendon edges was also noted.

The patient was scheduled for surgical repair of the tendon with the use of Biomet's DermaSpan™ Acellular Dermal Matrix for augmentation. Because of delays with workers compensation approval in addition to normal testing and clearance of the patient, surgery was performed two months after the initial visit and three and a half months after the date of injury.

Surgical Procedure

A linear longitudinal incision was made about the midline of the tibialis anterior tendon at the level of injury. The incision was deepened beyond the extensor retinaculum where the ruptured tendon sheath was encountered. It was noted at this time that there was partial healing of the tendon, although approximately 2 cm longer than anatomical. A 2 cm section of the tendon was excised and the tendon was repaired with a modified Krakow stitch using 2-0 suture (Figure 1, 2).

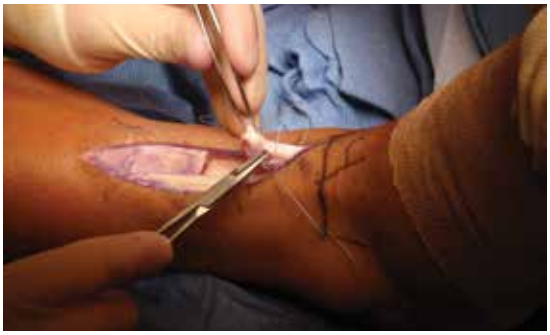

Fig. 1
Tendon repair with 2-0 suture.

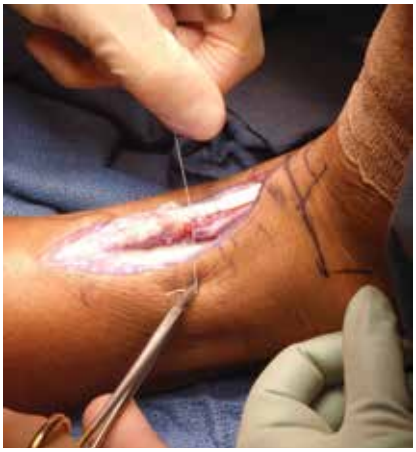

Fig. 2
Tendon repair via modified Krakow stitch

A DermaSpan™ Acellular Dermal Matrix measuring 4 cm x 4 cm was used to wrap the tendon over the repair site (Figure 3). The proximal aspect of the graft was wrapped around the tendon and sutured to itself under tension. 2-0 sutures were used to anchor the proximal graft to the tendon circumferentially. The same steps were then repeated distally ensuring that the graft was anchored under tension (Figure 4). The central aspect of the graft was now sutured to itself under tension, and any excess graft was resected (Figure 5). Multiple sutures were then used to further anchor the body of the graft to the tendon circumferentially (Figure 6). Only tapered needles were used throughout the procedure to prevent the possibility of cutting previously applied sutures.

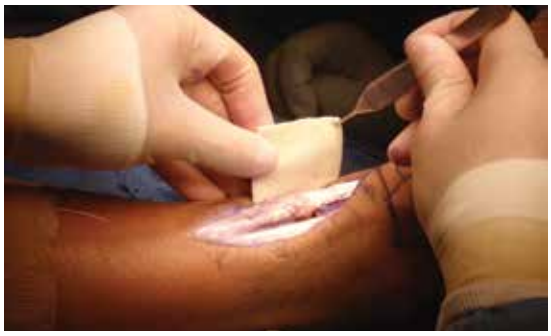

Fig. 3
Tendon wrapped with graft

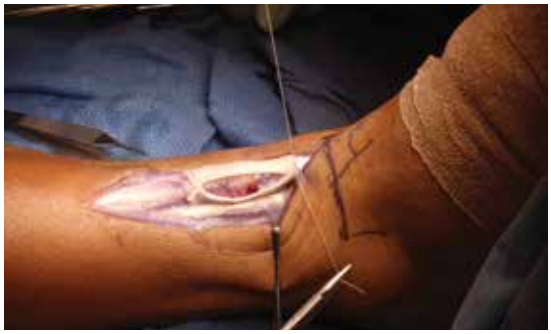

Fig. 4
Graft anchored around tendon

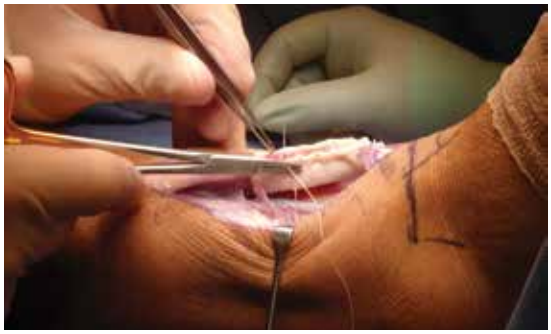

Fig. 5
Anchored graft under tension

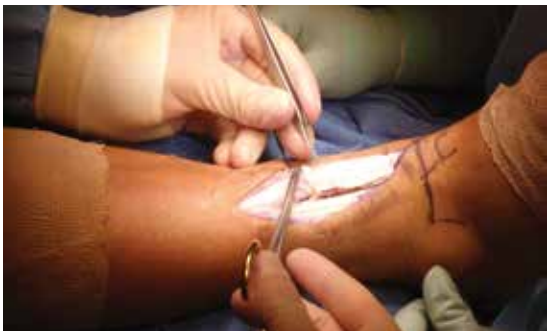

Fig. 6
Anchored graft circumferentially

The tendon sheath and extensor retinaculum were repaired and the wound was closed in layers. A posterior splint was applied in dorsiflexion above neutral, ensuring that the position was maintained while the patient emerged from anesthesia.

Rehabilitation

On the initial visit one week postoperatively the possibility of a superficial infection was suspected. The patient was treated with one week of antibiotics and went on to heal without incident.

Skin staples were removed at three weeks postoperatively. At this time a short-leg cast was applied which the patient only tolerated for five days. The patient was then placed in a CAM walker but kept non-weight bearing for two more weeks. The patient was then allowed to begin partial weight bearing progressing to full weight at seven weeks postoperatively.

Postoperative Follow-up

The patient was seen several times over the next two months before being discharged, having reached maximum medical improvement with a 0% impairment rating. The patient returned to full activity without pain or loss of strength.

Conclusion

The use of Biomet's DermaSpan™ Acellular Dermal Matrix for augmentation of a tendon repair strengthened the repair with minimal bulk, allowing for restoration of normal strength and motion.

References

1. Popovic N, Lemaire R. Diagnosis and treatment of acute ruptures of the Achilles tendon. Current concepts review. Acta Orthop Belg. 1999 Dec; 65(4): 458-71.

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