Accuracy of a Single Tunnel Technique for Reconstruction of the Interosseous Talocalcaneal Ligament: Technical Pearls and Structures at Risk

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INTRODUCTION

Numerous reconstructive techniques to address subtalar joint instability have been described. Recent interest has focused on direct anatomic repair of the interosseous talocalcaneal ligament (ITCL) with tendon autograft, which is passed through osseous tunnels of the talus and calcaneus within the native anatomic boundaries of the compromised ITCL. To the best of our knowledge, the technique employed to accurately place a guidewire and create a percutaneously developed tunnel through the anatomical footprint of the ITCL to restore it has not been described. The purpose of this study was to confirm that an osseous tunnel could be positioned within the ITCL ligamentous footprints, both accurately and safely. We also sought to define anatomic landmarks that can be used as reference points to reproduce an accurate tunnel for ITCL reconstruction. Lastly, we assessed the structures at risk.

METHODS

Under fluoroscopy, an anterior cruciate ligament guide was utilized to place a drill tunnel from the plantar lateral aspect of the calcaneus, across the sinus tarsi, and through the dorsal medial talus in 10 cadaveric specimens. Monofilament wire was passed through this tunnel to serve as a simulated model for cortical button fixation. Five specimens (group 1) were dissected; structures at risk and distance to the center of the ITCL were recorded. The procedure was performed on the remaining specimens (group 2) to assess for improvement in technique.

RESULTS

The mean distances from the wire to the ITCL on the calcaneus and talus were 2.92 mm and 4.04 mm, respectively. Mean distances from the wire to ITCL on the calcaneus in groups 1 and 2 were 4.04 mm and 1.80 mm, respectively (p=.04). Mean distances from the wire to ITCL on the talus in groups 1 and 2 were 6.23 mm and 1.84 mm, respectively (p=.08). Violated structures included the tibialis anterior tendon in one specimen, and the most dorsal aspect of the talar head cartilage in 2 specimens.

Specimen ID	Talus (mm)	Calcaneus (mm)	Peroneal Tendons	Sural Nerve	CCJ	TA	TNJ	Plantar/Dorsal to GSV
1	9.37 D	5.0 D	No	No	No	No	No	Dorsal
2	11.32 D	3.5 D	No	No	No	No	Yes	Plantar
3	3.0 D	4.3 D	No	No	No	No	No	Dorsal
4	0	4.38 D/L	No	No	No	No	No	Dorsal
5	7.46 D/M	3.0 D	No	No	No	Yes	No	Plantar
6	0	0	No	No	No	No	No	Dorsal
7	2.1 M	0	No	No	No	No	No	Dorsal
8	3.8 D	4.5 L	No	No	No	No	No	Dorsal
9	3.3 D	2.5 D	No	No	No	No	No	Dorsal
10	0.00 center	2.0 P	No	No	No	No	Yes	Dorsal

Table 1. D= Distal to Center of the interosseous talocalcaneal ligament footprint; P= Proximal; M= Medial; L= Lateral; CCJ= Calcaneocuboid Joint; TA= Tibialis Anterior tendon; TNJ= Talonavicular Joint; GSV= Great Saphenous Vein

Figure 1: An ACL reconstruction guide was positioned on the plantar lateral aspect of the heel and medially to a point just medial to the tibialis anterior tendon overlying the dorsomedial neck of the talus.

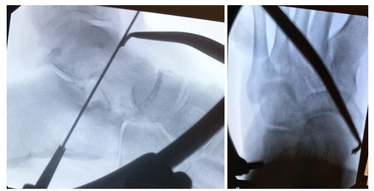

Figure 2: A guidewire was passed through the ACL guide and across the subtalar joint under fluoroscopy.

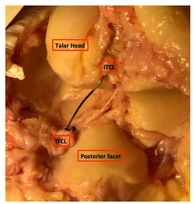

Figure 3: A thin monofilament wire was threaded through this tunnel to ensure accurate identification of our tunnel position after dissection.

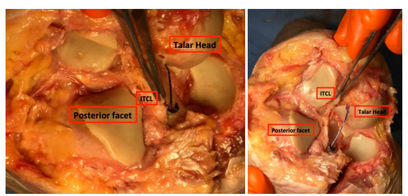

Figure 4: The mean distances from the wire to ITCL on the talus in groups 1 and 2 were 6.23 mm and 1.84 mm, respectively.

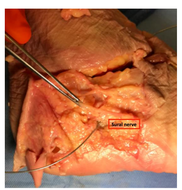

Figure 5: The sural nerve, peroneal tendons, and calcaneocuboid joint were not violated with this trajectory.

Figure 6: The tibialis anterior was violated in 1 specimen.

DISCUSSION

Under fluoroscopic guidance, a tunnel can be directed across the ITCL footprint accurately and safely. In our practice, we have reconstructed the ITCL with a cortical button fixation device using this technique and found it to be efficient and effective.

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