Posterior Tibial Tendon Allograft Reconstruction for Stage II Adult Acquired Flatfoot

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Purpose

The mainstay surgical treatment for stage II adult acquired flatfoot (AAFF) has consisted of repair of the diseased posterior tibial (PT) tendon and/or tendon transfer. This is combined with various osteotomies to address deformity. This case study demonstrates an alternative to tendon transfer with PT tendon allograft reconstruction.

Literature Review

Murray, et al. found that, in regards to plantarflexory power of the foot, the torque of the FDL was 25.1 kg/cm compared to the PT which was 52.0 kg/cm. The PT generates approximately 20-38% of plantarflexory power of the foot (1). Furthermore, Hui, et al. found that the FDL to navicular transfer limited the inversion compacity of the FDL at the hindfoot by 36 percent (2). It is of note that the functionality of this procedure has been found to be inadequate in both isolation (2) and in combination (4,5) with further reconstructive surgery. These findings suggest that an alternative approach should be sought for more stable and favorable outcomes. Sammarco et. al. proposed the use of the FHL instead of the FDL, given that its strength 40.4 kg/cm in the aforementioned study is closer to the PT (3). However, harvesting a FHL tendon with adequate length has inherent risks and complications, reported as high as 33%. Disturbing regional anatomy and loss of strength and function is a concern with any tendon transfer (6).

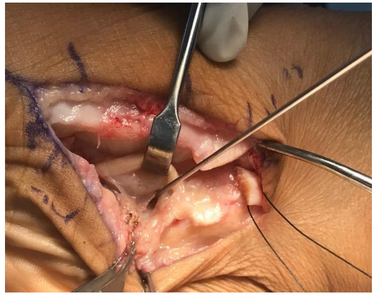

Fig. 1. A guidewire is placed into the sustentaculum tali for a proprietary anchor with attached non-absorbable suture tape for spring ligament repair.

Case Study

Two patients who underwent stage II flatfoot reconstruction with concomitant PT tendon allograft transplantation were included in this study. Both patients had preoperative radiographs demonstrating flatfoot deformity and MRI showing advanced tendinopathy of the PT tendon. Additional procedures included posterior muscle group lengthening, peroneus brevis to longus transfer, spring ligament repair, lateral column lengthening, medial displacement calcaneal osteotomy and cotton osteotomy. Post-operatively both patients remained non-weight bearing in a short leg cast for 6 weeks. Serial radiographs were performed throughout the post-operative course demonstrating osseous consolidation of osteotomy sites with well-maintained alignment. No complications were encountered. Both patients regained 5/5 muscle strength at the time of final follow up.

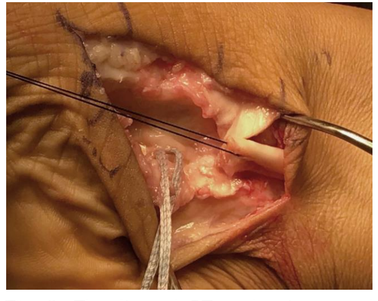

Fig. 2. The diseased PT tendon is resected proximally back to healthy appearing margin. Excursion of muscle-tendon unit is manually evaluated to confirm viability.

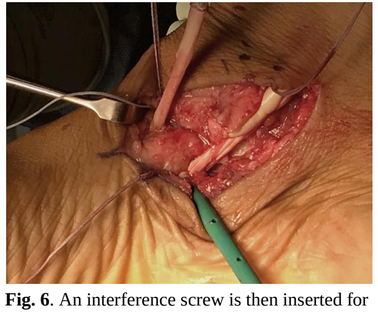

Fig. 6. An interference screw is then inserted for fixation of the allograft tendon and suture tape into the navicular. This is performed while the foot is held in a supinated position while adequate tension is maintained.

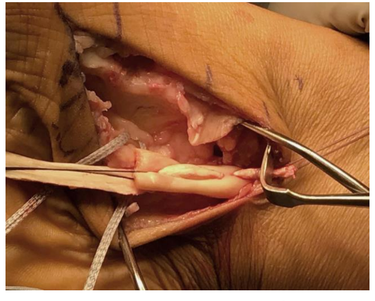

Fig. 3. The semi-tendinosis allograft tendon is then attached to proximal stump of PT tendon with a Pulvertaft weave technique.

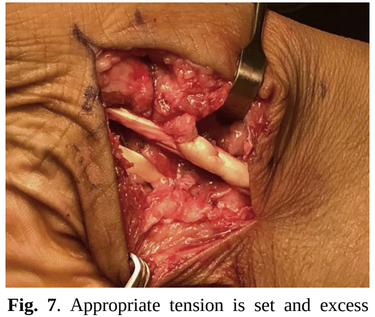

Fig. 7. Appropriate tension is set and excess tendon is excised revealing final construct seen above.

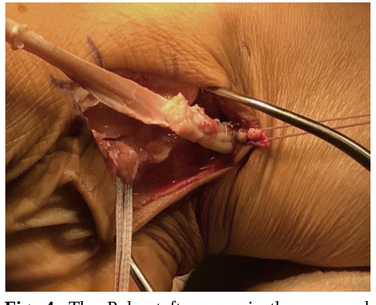

Fig. 4. The Pulvertaft weave is then secured with non-absorbable suture.

Discussion

Allograft reconstruction of the PT tendon, as described above, has several theoretical advantages to tendon transfer. This is due to both the preservation of normal anatomy and function of the PT tendon-muscle unit. The use of tendon transfers, specifically the FDL has been studied extensively for stage II AAFF. However, the FDL has been shown to be weak relative to the PT tendon. Furthermore, the FDL diameter is half that of PT. Concern remains regarding both the ability of the FDL to recreate the force of the PT tendon and the potential complications of the additional procedure itself. Our results, while limited in patient numbers, demonstrate that PT tendon allograft reconstruction combined with flatfoot reconstruction is a viable option. We believe the advantage to this procedure is preserving the stronger muscle tendon unit without disturbing regional anatomy and minimizing the risk of functional complications.

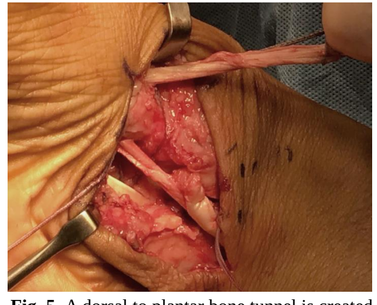

Fig. 5. A dorsal to plantar bone tunnel is created in the navicular. The tendon and suture tape are passed through the bone tunnel allowing for appropriate tensioning.

References

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Financial Disclosures

None