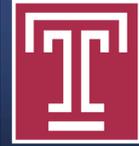


Autologous Fat Grafting for the Treatment of Chronic Equinus and Contracture Scar of the Achilles Tendon



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Statement of Purpose and Literature Review

In cases where medical and surgical therapies are exhausted for scar treatment, autologous fat grafting has proven to be a novel alternative to repair tissue damage, although there is limited data on its use for lower extremity scars.¹

Originally proposed for treatment of congenital deformities and complex traumatic wounds in 1893 by Gustav Neuber, the major disadvantage of this technique was an unpredictable reabsorption rate of volume grafted.^{1,2} Coleman and associates proposed a new technique in 1992 whereby they increased the survival of fat harvested by liposuction and transplanted via injection. Fat is generally harvested from abdominal or trochanteric areas where abundant adipose tissue is present. Following centrifugation, which separates the tissue into three layers, it is transplanted via a Luer-lock syringe.³ The fraction is inserted into the dermo-hypodermic junction at the target site.

Several other case reports documenting autologous fat grafting for various scar treatment have shown some degree in improvement of scar quality, namely a reduction in difference from normal skin.⁴ Many outcome measures have been documented regarding fat grafting of scars and overall improvement of scars following treatment which look at achievement of normal-skin characteristics.⁵⁻¹⁷ Long-term results are highly variable and difficulty lies in limited techniques to assess viability of transferred adipose tissue.² Furthermore, surgical approaches to correcting scars on lower limbs have usually been avoided because of they are anatomical areas of increased tension and movement.³

Therefore, the purpose of this study was to review a case where autologous fat grafting was utilized for treatment of Achilles contracture with subsequent scar formation following exhaustion of conservative and surgical intervention.

Case Study

A 70-year-old male with no past medical history presented to our clinic in October 2015 after rupturing his Achilles tendon one month prior. MRI was performed and confirmed complete rupture of his Achilles tendon with a 3 cm deficit. The patient was immobilized and in December 2015 underwent Achilles tendon repair with flexor hallucis longus transfer. The patient developed a dehiscence six weeks following repair. He underwent local care with enzymatic debridement ointment and wound VAC. In March 2016 the patient underwent wound debridement and application of a biologic bilayer wound matrix dressing. The wound persisted and in April 2016, he had a sural flap performed to the right leg, which was 80% adherent after one month. The patient began physical therapy for chronic equinus contracture in October 2016. He also used continuous passive motion machine. His contracture did not improve with conservative modalities, so in January 2017, an endoscopic gastrocnemius recession with synovectomy, posterior capsule release, and Achilles tendon lengthening was performed. With continued contracture and scarring, fat grafting was pursued for scar release in April 2017. The Coleman technique was utilized to harvest and transplant adipose tissue from the right abdomen to the area of right Achilles scarring (Figures 4-6). In total 14 cc of centrifuged adipose tissue was injected. He reported improvement in pain post-operatively, although small ulceration was noted to the injection site, which was addressed with local care. He continued physical therapy where range of motion of his right ankle progressed (Table 1). Passive dorsiflexion was noted to be within normal limits although some restriction was noted with active dorsiflexory range of motion. By September 2017, he had no pain with range of motion, although ulceration persisted. In November 2017 he did develop cellulitis around the now chronic ulceration for which he was treated without complication with oral antibiotics. The small wound persisted and was noted to be 0.2 x 0.2 cm in April 2018 and the patient continued local care. By June 2018 there was complete resolution noted of the ulceration with only mild dermatitis noted to the area. Some remaining equinus contracture was noted with active range of motion, however, the patient denied any pain to the area.

Physical Therapy Session	Dorsiflexion Range of Motion (Leg Extended)	Additional Observations
12/19/2016	-15°	Patient unable to achieve neutral ankle position
01/31/2017	-15°	Total sagittal excursion of ankle joint is 35°
04/20/2017	-4°	Total sagittal excursion of ankle joint is 50°
04/27/2017	0°	Patient able to achieve passive neutral ankle joint position
05/11/2017	5°	Patient able to achieve active neutral ankle joint position

Table 1: Amount of dorsiflexory range of motion and progression with physical therapy



Figures 1, 2, and 3: Clinical appearance of the posterior ankle in October 2016, March 2017, and April 2017



Figures 4, 5, and 6: Harvesting fat for graft from the abdomen, preparing fat for graft, and injecting to posterior Achilles

Analysis and Discussion

Exhaustion of attempts to fix this patient's chronic equinus contracture lead us to pursue an alternative option well-documented in the plastic surgery literature. Autologous fat grafting has been shown to be an effective technique for small volume augmentation. In this case, the graft, along with release of the adhered tendon, would create a soft barrier between the tendon and superficial tissue. The patient found improvement in both pain and range of motion with his contracture postoperatively.

In patients presenting with chronic lower extremity deficits leading to painful scarring and contracture, this procedure is an effective alternative. It may serve to provide improvement in pain following the procedure and allow for range of motion exercises to be more effectively performed. Furthermore, autologous fat grafting should be considered before attempting more invasive procedures for correction of painful and retractile scars in the lower extremity. Colonna et al. achieved good results with each of their three cases where autologous fat grafting was utilized, including two lower-extremity injuries that resulted in painful, retractile scars. Autologous fat grafting ultimately minimized the need for further surgery for scar contracture, tenoarthrolysis, and resulted in stable follow up.²⁰ Our case report for utilizing autologous fat grafting further supports its use for lower extremity scars in terms of patient satisfaction, pain, and functionality.

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