

Cryopreserved Adipose Tissue (CAT) for Biological Offloading of Recalcitrant Foot Ulcers

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Introduction

Recalcitrant diabetic foot ulcers (DFU) are increasing in prevalence and often have exhausted conventional conservative measures. Diabetic foot ulcers in the most severe situations lead to amputation or even death secondary to infection and/or ischemia. The risk of a diabetic patient who has a foot ulceration undergoing either a minor or major amputation is between 14% and 24%.⁽¹⁾ Current literature discusses the use of adipose derived stem cells and other modalities to assist with healing DFU's. However, a major focus is on regenerative capability of adipose derived stem cells and not on the structural capabilities.⁽²⁾ Current literatures also discusses the use of offloading devices and techniques for treating diabetic ulcerations including total contact casting, diabetic shoes, diabetic inserts, and removable cast boots.⁽³⁾ All of these devices have setbacks including patient compliance, efficacy, and cost. The proposed use of CAT will utilize the adipose to provide offloading to the DFU using this tissue that maintains its structural nature even after cryopreservation. In this project we aim to determine the utility of CAT injections to improve outcomes for patients with recalcitrant foot ulcers in our clinic.

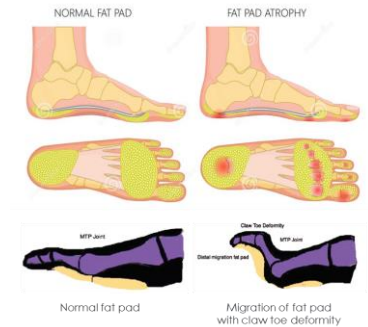
Cases



Cryopreserved adipose tissue was injected adjacent to the wound borders to provide in vivo offloading of the wound bed. In these cases of recalcitrant ulceration there was a significant amount of scar tissue that was well adhered to underlying structures. This required creating a tissue plane either through the wound bed or a small stab incision to inject the allograft into the peri wound area. Once complete injection sites are sealed with skin glue and a dry sterile dressing was applied.

Discussion

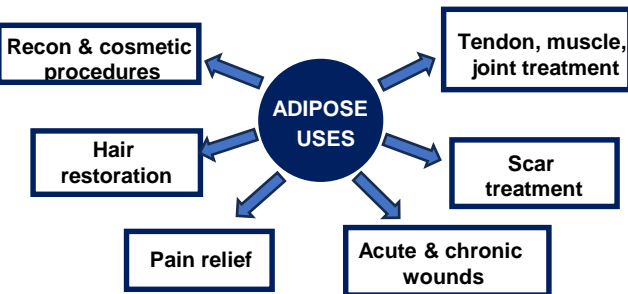
For the patients who received CAT, the graft was palpable at site of implantation at all postoperative office visits. Significant improvement in the clinical appearance of the wounds was evident in all cases; however, not all of the wounds were healed at the time of writing. It was noted that there was significant reduction in periwound callus formation. There were no CAT-related complications. Long-term follow-up is continuous and ongoing.



CAT is an allograft which retains the structure of native tissue that provides cushioning and structural support. Based on clinical evaluation CAT injections are a viable tool for treating recalcitrant foot ulceration. CAT has to this point maintained structural support at the sites of implantation. This patient population has had ulcerations that have waxed and waned for a minimum of a year. Due to the longevity of these wounds additional follow-up will be required to further evaluate CAT durability.

References

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2. Lonardi R, Leone N, Gemma S, Trevisi Borsari G, Covic T, Silingardi R. Autologous micro-fragmented adipose tissue for the treatment of diabetic foot minor amputations: a randomized controlled single-center clinical trial (MIFRADIF). *Stem Cell Res Ther.* 2019 Jul 29;10(1):223. doi: 10.1186/s13287-019-1328-4. PMID: 31358046; PMCID: PMC6664586.
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Images above show the preoperative wound on the left and the most recent postoperative wound on the right. Patients range in age from 45-80 years old with wounds that have been in various stages of healing for a minimum of 1 year. Traditional offloading and wound care has been continued in all patients with the area of the CAT injection being offloaded with felt for 1-3 weeks post operatively. Clinically the graft is palpable at the sites of injection and is firm to the touch without any displacement noted.

