Limb Salvage in a High-Risk Dialysis Patient: Healing a Trimalleolar Fracture with Chronic Wounds Using Borate-Based Bioactive Glass Fiber Matrix After Debridement and Arthrodesis External Fixation

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INTRODUCTION

Limb salvage in patients with end-stage renal disease (ESRD), immunosuppression, and chronic wounds presents a significant clinical challenge due to impaired perfusion, delayed healing, and elevated infection risk.[2] These factors often lead to major amputation when orthopedic trauma or multisite wounds are present. Creating an optimal wound environment after surgical debridement is critical to promote angiogenesis, tissue regeneration, and durable healing. Borate-based bioactive glass fiber matrices (BBGFM) have emerged as an adjunct to proper wound care practices to support secondary intention healing. This case highlights BBGFM's use in a multimodal limb salvage strategy for a dialysis-dependent transplant patient with a complex ankle fracture and chronic lower extremity wounds.

METHODS

A 70-year-old male with ESRD on dialysis and prior liver transplant presented with a chronic medial venous leg ulcer (VLU). In December 2024, he sustained a trimalleolar ankle fracture complicated by fracture blisters and anterior foot eschar from dressing pressure, a complication from the VLU treatment. Vascular assessment showed non-palpable posterior tibial pulses with Doppler-detected dorsalis pedis signal. On Jan 10, 2025, he underwent left ankle arthrodesis with external fixation.

Adjunctive wound care included:

- 02/26/2025: Initial surgical debridement and BBGFM application to large defect wounds
- 03/19/2025: Subsequent debridement and BBGFM reapplication
- 04/14/2025: External fixator removal, debridement, BBGFM reapplication, and NPWT initiation

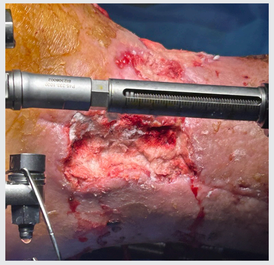
Wound progression was monitored through clinical observation and photographic documentation with measurements.

RESULTS

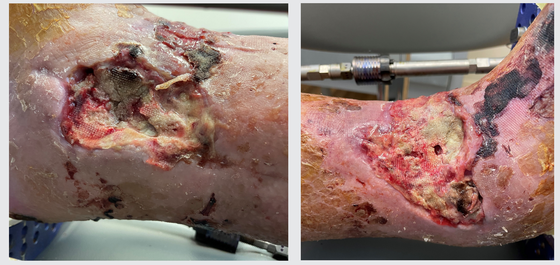
Over a three-month treatment period and following four applications of BBGFM, all wounds demonstrated substantial percentage area reduction, progressing to full closure. The matrix adapted well to complex wound topography, supporting robust granulation and enhanced wound bed vascularity. After removal of the external fixator and initiation of BBGFM-supported NPWT, the wounds remained stable with continued epithelialization and no signs of infection. This multimodal strategy resulted in complete wound resolution and successful limb salvage without further surgical intervention.

DISCUSSION

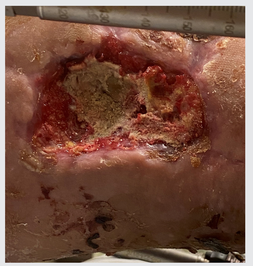
This case demonstrates the effective use of BBGFM as an adjunct in a successful limb salvage strategy for a high-risk patient with ESRD, transplant history, and complex lower extremity wounds. The BBGFM supported granulation, vascularization, and wound healing. The extracellular matrix like material provides an optimal environment to support new blood vessel formation and encourages native cell migration, resulting in a well vascularized and organized wound bed. This case underscores the BBGFM's role in limb salvage protocols where chronic wound healing is impaired. Further investigation is warranted to define its efficacy in similarly high-acuity populations.



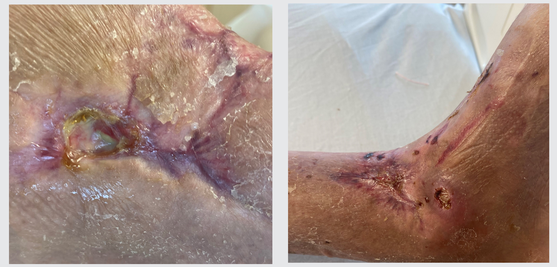
Initial Application post op week 6
Left lower extremity wound site with MirraSurg applied



Week 8
Left lower extremity wound site with MirraSurg applied



Week 10
Left lower extremity wound site with granulation tissue surrounding MirraSurg



Week 19
Left lower extremity wound site

REFERENCES

1. Armstrong DG, et al. Diabetic foot ulcers and their recurrence. N Engl J Med. 2017;376(24):2367–2375.
2. Frykberg RG, Banks J. Challenges in the treatment of chronic wounds. Adv Wound Care. 2015;4(9):560–582.

Acknowledgements: *MirraSurg wound matrix, ETS Wound Care, LLC. This poster was prepared in collaboration with ETS Wound Care, LLC. All protocols and clinical assesments were conducted and reported independently by Houston Methodist of without any financial compensation from the manufacturer. For application instructions and risks of this device, please refer to the MirraSurg Instructions for Use.