

Advanced Management of Chronic and Post-Surgical Diabetic Foot Wounds Using a Borate-Based Bioactive Glass Fiber Matrix

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INTRODUCTION

Chronic diabetic foot ulcers (DFUs) present significant clinical challenges, particularly when refractory to standard care or complicated by surgical interventions. Persistent fibrotic tissue, structural deformities, and prior treatment failures often prolong healing and increase risk for infection and amputation.¹ Borate-based bioactive glass fiber matrices (BBGFM) have demonstrated potential in supporting wound healing through modulation of the wound environment and facilitation of tissue regeneration.² This report describes two complex DFU cases treated with BBGFM after prolonged conventional therapy or surgical complications.

METHODS

Two patients with complex DFUs were treated with BBGFM alongside standard wound care protocols. Case 1 involved a 52-year-old female with a chronic right foot ulcer refractory to enzymatic debridement, collagen dressings, and advanced wound care for over six months. The wound measured 5 × 4.5 × 1.5 cm with an additional 1.2 cm plantar probe along the flexor hallucis longus tendon sheath, with 100% fibrotic wound base. Case 2 involved a 68-year-old male with Charcot midfoot deformity on the right side. Following a “Reverse Cole” midfoot osteotomy arthrodesis coupled with a triple arthrodesis with external fixation, the patient developed medial and lateral foot ulcer dehiscence with severe highly resistant polymicrobial infection, with heavy drainage that exposed the bone of the right foot. BBGFM was applied periodically to each wound with wound V.A.C., with frequency guided by clinical assessment of wound bed status.

RESULTS

In Case 1, progressive wound healing was observed after approximately 21 BBGFM applications, with complete wound base area closure. In Case 2, significant closure of the dehisced DFU sites was achieved after 11 applications of BBGFM, with evidence of healthy tissue regeneration and resolution of exposed structures. Both patients tolerated treatment without adverse events, and clinical assessment indicated readiness for eventual device removal of the external fixator in case 2 to full healing. BBGFM substitution also resolved wound V.A.C. clogging issues previously experienced by using collagen dressing in wound V.A.C. applications for the patient in Case 2.

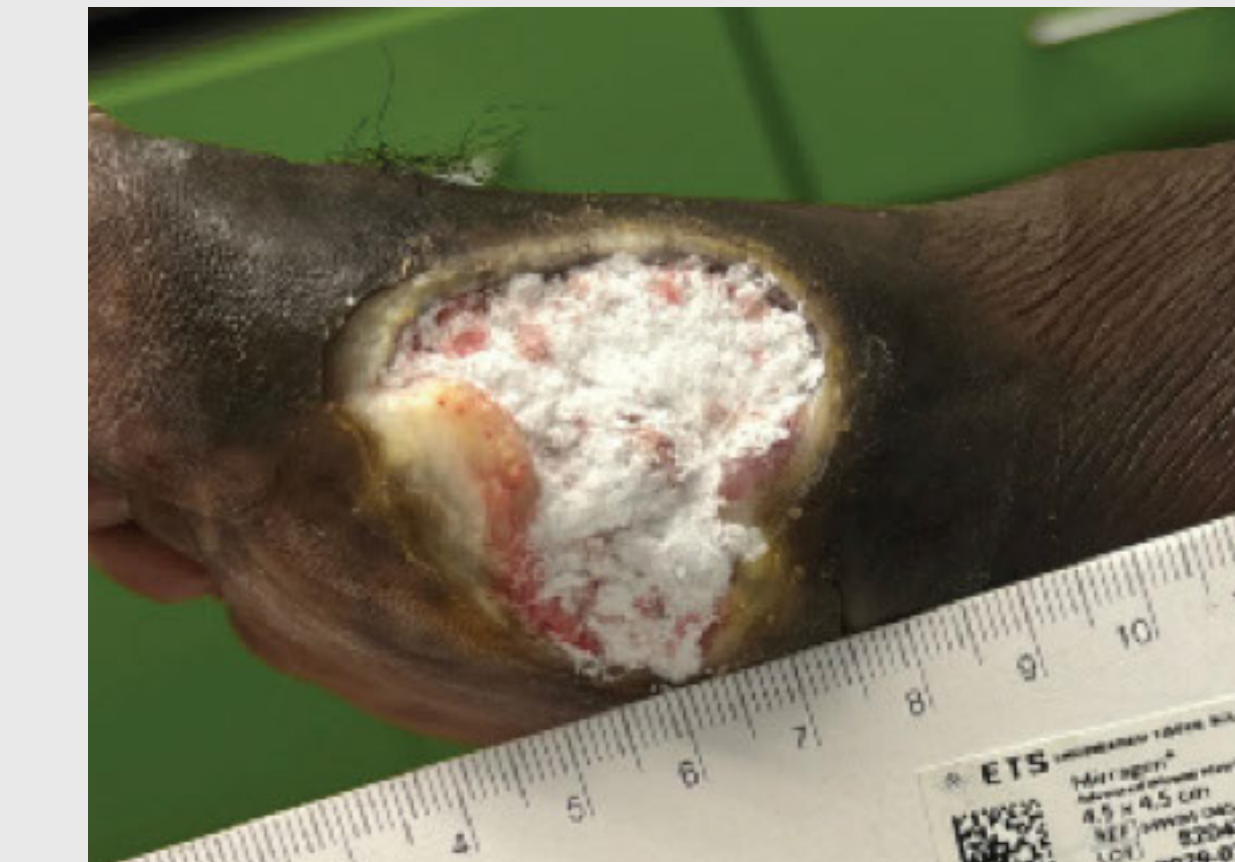
DISCUSSION

BBGFM was seen to facilitate meaningful wound closure in two patients with complex DFUs unresponsive to prior therapies or complicated by dehiscence. The BBGFM was very effective in providing a sacrificial anti-microbial barrier over the exposed bone that allowed for the heavy drainage of the bone and joints to pass through the BBGFM while limiting bone exposure to the saturated wound vac dressing environment. While the patient received IV antibiotics for the infection prior to Mirragen application, localized cellulitis started to decrease significantly more after Mirragen was applied, suggesting possible localized antimicrobial activity. Further investigation of this proposed finding is warranted. These cases highlight the potential role of BBGFM as an adjunctive therapy in promoting healing in chronic, fibrotic, or surgical wounds where standard care alone may be insufficient. These cases underscore BBGFM’s potential as a powerful adjunctive therapy capable of transforming chronic and post-surgical wound care by promoting tissue regeneration and facilitating closure in challenging scenarios. BBGFM’s permeability also makes it an attractive option to use with wound V.A.C. application.

REFERENCES

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2. Armstrong DG, Orgill DP, Galiano RD, et al. A Borate-Based Bioactive Glass Advances Wound Healing in Non-Healing Wagner Grade 1 Diabetic Foot Ulcers: A Randomised Controlled Clinical Trial. *Int Wound J*. 2025;22(10):e70763.

CASE 1



Case 1 involved a 52-year-old female with a chronic right foot ulcer refractory to enzymatic debridement, collagen dressings, and advanced wound care for over six months. The wound measured 5 × 4.5 × 1.5 cm with an additional 1.2 cm plantar probe along the flexor hallucis longus tendon sheath, with 100% fibrotic wound base



CASE 2: Medial



Right foot medial ulcer Initial Presentation

Right foot medial ulcer initial presentation with BBGFM in place

Healed medial foot ulcer

Lateral



Right foot lateral ulcer Initial Presentation

Right foot lateral ulcer with BBGFM in place

Healed foot Ulcers Anterior View

BBGFM was applied periodically to each wound with wound V.A.C., with frequency guided by clinical assessment of wound bed status. Significant closure of the dehisced DFU sites achieved after 11 applications of BBGFM; evidence of healthy tissue regeneration and resolution of exposed structures.

ACKNOWLEDGEMENTS

*Mirragen Advanced Wound Matrix, ETS Wound Care, LLC. This poster was prepared in collaboration with ETS Wound Care, LLC. All protocols and clinical assessments were conducted and reported independently by Caring Foot & Ankle Specialists without any financial compensation from the manufacturer. For application instructions and risks of this device, please refer to the Mirragen Instructions for Use.