Use of a Borate-Based Bioactive Glass Martix on Infected, Exposed Hardware

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INTRODUCTION

A dreaded complication of implanting surgical hardware is a wound dehiscence resulting in hardware exposure; which places the wound at risk for infection and biofilm formation. Once established, biofilms are difficult to eradicate, with a high rate of recurrence even after surgical debridement. As such, there exists a significant need for novel technologies that can help us expedite healing in wounds with exposed hardware. Here we evaluate a borate-based bioactive glass matrix* in this challenging setting.

METHODS

Post-surgical dehisced wounds, with hardware exposure, were surgically debrided as a treatment for infection and presumed presence of biofilm. After debridement, a bioactive glass matrix was applied to the wound and over the exposed hardware. The bioactive glass was applied to eradicate the biofilm and local infection, and to aid in healing. The bioactive glass was covered with a dermal scaffold.

RESULTS

In two consecutive cases, the bioactive glass matrix successfully eradicated the wound infection and biofilm, resulting in full granulation of the wound and successful wound closure.

DISCUSSION

In the event of wound dehiscence with exposed hardware, the clinician should be aware of the risk of delayed healing, prolonged infection and failure of delayed primary closure. Consideration of newer technologies, such as bioactive glass, should be considered as an important adjunct to prevent the aforementioned complications.

Few wound matrices, or scaffolds, are antimicrobial, which limits their utility in contaminated, or infected wounds. Likewise, even fewer of these materials can perform in the presence of biofilm. Several reports have demonstrated the antimicrobial and antibiofilm effects of a novel borate-based bioactive glass matrix on wound relevant pathogens. Here we present two cases in which this technology was utilized to eradicate infection and biofilm, to support successful secondary intent healing over exposed hardware.

Hardware exposure is a challenging complication following foot and ankle surgery due to the high risk of infection, biofilm formation, and delayed healing. Time is of the essence to heal these chronic wounds as prolonged wound duration correlates with the need for further surgeries, hospitalizations and the potential for amputation. Here we present a novel bioactive glass matrix that successfully managed exposed hardware in an infected foot, providing a promising treatement strategy for managing these complications and preventing further morbidity.

References:

Archer NK, Mazaitis MJ, Costerton JW, Leid JG,Staphylococcus aureus biofilms: Properties, regulation, and roles in human disease. Virulence, 2011 Sep 1;2(5):445- 59. Epub 2011 Sep 1

Armstrong, David G., et al. "A multi?centre, single?blinded randomised controlled clinical trial evaluating the effect of resorbable glass fibre matrix in the treatment of diabetic foot ulcers." International Wound Journal, vol. 19, no. 4, 2021, pp. 791 801

Buck, Donald W. "Innovative bioactive glass fiber technology accelerates wound healing and minimizes costs: A case series." Advances in Skin & Wound Care, vol. 33, no. 8, 2020, pp. 1–6

Gristina AG, Naylor PT, Myrvik QN: Mechanisms of Musculoskeletal Sepsis. Orthop Clin North Am, 1991; 22:363-371

Jung S, Schultz G, Mafiz AI, et al.: Antimicrobial effects of borate-based bioactive glass wound matrix on wound-relevant pathogens. J Wound Care, 2023;32(12):763-772

Jung S, Day T, Boone T, et al.: Anti-biofilm activity of two novel, borate based, bioactive glass wound dressings. J Biomed Glasses, 2019;5:67-75

11.19.23

1.26.23

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