Presented at The Symposium on Advance Wound Care (SAWC) Spring | WHS 2026, April 8th - 12th

# Efficacy of Monolayer and Bilayer Biodegradable Synthetic Matrix and Skin Grafting in Upper Extremity Necrotizing Soft Tissue Infections

Yale Kadesky, MD
Marvin Mendez, RN

## Introduction:

Amputation rates of upper extremity (UE) necrotizing soft tissue infections (NSTIs) range from 11% to 38% [1]. Bilayer biodegradable synthetic matrix (BSM) has shown success in the management and reconstruction of NSTI defects with exposed structures [2]. Bilayer BSM is a scaffold designed to help form a wound suitable for split thickness skin grafting (STSG), with a sealing layer for wound temporization [3]. Monolayer BSM is the same scaffold without the sealing layer but lacks clinical evidence. This two patient case series demonstrates the efficacy of BSMs to avoid amputation in UE NSTIs. Both adult patients had a history of methamphetamine and tobacco use and presented with signs and symptoms of left UE NSTIs, requiring antibiotics and surgery.

**Case 1**

An excision was performed from axilla to wrist, down to fascia and muscle (fig.1). Another excision was performed the following day, revealing a tunneling defect (fig. 2) leading to the axillary artery, vein and brachial plexus. Monolayer BSM was packed into the tunnel, bilayer BSM was stapled over the entire defect (fig. 3) and dressed in negative pressure wound therapy (NPWT). After eleven days, NPWT and the sealing layer of bilayer BSM were removed. Monolayer BSM was reapplied into the tunnel, bilayer BSM was reapplied to the axilla and upper arm and dressed in NPWT. After two weeks, NPWT was removed and the patient continued with daily hypochlorous acid dressings. After ten days (fig.4), the sealing layer of bilayer BSM was removed, a STSG was applied to the entire wound bed and dressed in NPWT. After one week, NPWT was removed and the STSG had 95% take.

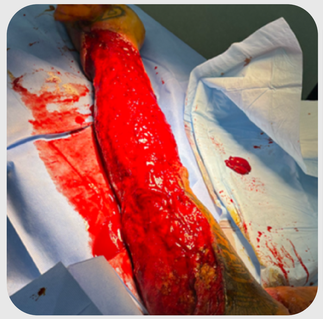

**Figure 1:** NSTI post excision

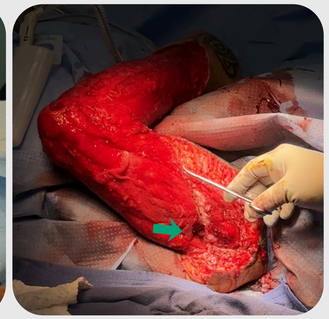

**Figure 2:** Tunneling defect

**Figure 3:** Bilayer BSM application

**Figure 4:** Wound bed before removal of sealing layer

**Figure 5:** BSM, NPWT and STSG outcome

**Case 2**

An excision was performed down to fascia, muscle and bone. A bone biopsy was obtained which confirmed osteomyelitis. After one week, another excision and ostectomy of the infected bone were performed which left an opening into the medullary cavity of the humerus. Bilayer BSM was stapled over the entire defect and dressed in NPWT. After twenty-three days, the sealing layer of bilayer BSM was removed. Monolayer BSM was packed into the medullary cavity of the humerus (fig. 7), bilayer BSM was reapplied to the entire defect (fig. 8) and dressed in NPWT. After twelve days, NPWT was removed and the patient continued with daily hypochlorous acid dressings. After one week, the sealing layer of bilayer BSM was removed (fig. 9), a STSG was applied to the entire wound bed and dressed in NPWT. After ten days, NPWT was removed and the STSG had 100% take.

**Figure 6:** NSTI Initial presentation

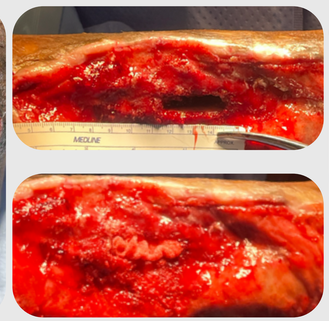

**Figure 7:** Monolayer BSM packed into cavity

**Figure 8:** Bilayer BSM application

**Figure 9:** Wound bed after removal of sealing layer

**Figure 10:** BSM, NPWT and STSG outcome

## Discussion:

This surgical approach resulted in successful graft take despite having exposed vital structures and osteomyelitis. Specifically, monolayer BSM was able to help form granulation tissue in the medullary cavity of the humerus and tunnel into the axilla. The case series provides clinical evidence for the efficacy of surgically removing all infected tissue, using monolayer BSM as a scaffold to fill dead space, bilayer BSM as a scaffold and for wound temporization, NPWT as a bolster dressing and to manage excess drainage, and STSG for definitive closure in UE NSTI defects to avoid amputation.

**References:**

[1] Ditsios K, Chitas K, Christidis P, Charatsis K, Katsimentzas T, Papadopoulos P. Necrotizing Fasciitis of the Upper Extremity - A Review. Orthop Rev (Pavia). 2022 Aug 25;14(3):35320. doi: 10.52965/001c.35320. PMID: 36034724; PMCID: PMC9404292.

[2] Wagstaff, M. J., Salna, I. M., Caplash, Y., & Greenwood, J. E. (2019). Biodegradable temporising matrix (BTM) for the reconstruction of defects following serial debridement for necrotising fasciitis: a case series. Burns Open, 3(1), 12-30.

[3] Kostova M, Alexander T D, De La Cruz Monroy M, et al. (December 19, 2024) The Efficacy of Biodegradable Temporising Matrix for Upper Limb Reconstruction: A Systematic Review and Meta-Analysis. Cureus 16(12): e75994. doi:10.7759/cureus.75994

NovoSorb® – PolyNovo® North America LLC, Carlsbad, CA 92011 Disclosure: Marvin Mendez is a full-time employee of PolyNovo
Monolayer BSM has not been approved by FDA for use in medullary cavity of bone