



## Statement of Purpose

This project highlights methods utilized to successfully treat a patient who developed an extensive necrotizing fasciitis (NF) infection in their right lower extremity. During their hospital stay, numerous specialties deemed the patient a high risk for limb loss and recommended a below the knee amputation (BKA); however through diligent debridements and graft applications, the patient's life and limb were saved.

## Introduction

Necrotizing fasciitis (NF) is an aggressive skin and soft tissue infection with *Streptococcus pyogenes* being the most common and deadly organism due to rapid progression up deep fascial tissue<sup>1,4</sup>. Patient is a 52 year old female with past medical history of CHF, HTN, AKI, and DMII (A1c 5.8), CRP > 19, WBC 8.7 and extensive soft tissue infection to the right lower extremity (Fig. 1). She had previously recovered from an ipsilateral hallux amputation due to osteomyelitis less than 1 year from this NF infection. On physical exam, D/P/T pulses were 2/4 and triphasic, light touch sensation was intact, ROM to major muscles was 5/5.

Per standard of care, immediate debridement was performed (Fig. 2) followed by subsequent debridements, wound vac application, utilization of various bi-layer skin grafts and tissue substitutes<sup>2,3,5</sup>. The patient was on IV antibiotics and closely monitored. 60-week follow up showed significant improvement in wound healing with no remnant necrotic tissue.



Fig 1: Pre-debridement with necrotic eschar

Fig 2: Immediately following sharp debridement of necrotic eschar. Note exposed extensor and peroneal tendons.

## Methodology

This work evaluates the clinical progress of one patient over a period of 16 months from August 2022 to November 2023. They underwent multiple washouts with deep debridements in the operating room extending from the toes to the proximal lateral leg. The patient was kept on long term IV ceftriaxone.

Negative pressure wound therapy was applied for a period of 2 weeks in between product application. A micromatrix system was utilized to facilitate capillary ingrowth and cellular infiltration<sup>6,7,8</sup> (Fig. 3).

To augment remodeling of skin at the site of necrosis, a collagen-infused matrix was applied. This provided a scaffold for chemotaxis and to promote vasculature tissue formation<sup>9</sup> (Fig. 4). A 3-layer sheet applied to lateral leg while a 2-layer sheet was applied to the dorsal foot.

The products were secured to the wound with staples and protected with a soft and moist dressing for an average of 5 days. Dressing consisted of non-adherent gauze, lubricant jelly, soft dry gauze, Kerlix, ACE, and posterior splint. Healthy granular, at times hypergranular, tissue was appreciated at the time of graft removal (Fig. 5).



Fig. 3: Pre-fenestrated sheet and powder matrix



Fig. 4: Intra-operative application of powder matrix multi-layered sheet



Fig. 5: After removal of matrix.

## Results

Wound and abscess cultures all grew Group B *Streptococcus*. Vascular workup showed strong, triphasic pulses adequate for healing. Halfway through recovery, complications of an Achilles tendon rupture with calcaneal osteomyelitis led to further surgery (Fig. 6). Powdered matrix was applied to this site intra-operatively.

After serial debridements of necrotic tissue and diligent follow up with frequent dressing changes, the patient was able to successfully recover from their infection with life and limb intact. 30 week follow up shown in Fig. 7 and 8.

Mild necrosis was appreciated at the wound edges, with a mixed wound bed of majority granular tissue with some fibrotic tissue. Tendon exposure was beginning to decrease.

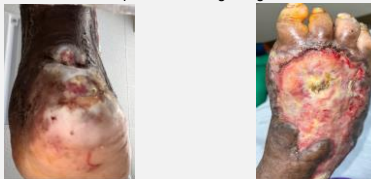


Figure 6: Achilles tendon and calcaneal wound. MRI did not show extensive osseous involvement.

Figure 7: 30 week follow-up showing emergence of granulation tissue with small island of tissue necrosis centrally.



Figure 8: 30 week follow-up detailing patches non-viable tissue over peroneal tendons and dorsal foot, approximately 70/30 granular to fibrotic tissue. Healthy bleeding and no purulence was appreciated.

## Discussion

A combination of infection control, sufficient distal vascular perfusion, and tireless wound care yielded positive outcomes for this patient. The matrices were able to reduce the amount of time cells spent in the inflammatory stage, often advancing them towards the proliferation phase of wound healing<sup>9,10</sup>.

The basement membranes provided a scaffold for cells to attach and take advantage of the already plentiful blood flow to promote neovascularization<sup>11</sup>.

The wound had completely granulated from within revealing a healthy layer of dermal tissue at the site of necrosis at 60 weeks (Figs 9, 10).



Fig. 9: Approximately 90% healing near the end of treatment

Fig. 10: Near-total healing at 60 weeks

## Conclusion

Multiple specialties such as Vascular Surgery, Infectious Disease, and Hospital Medicine deemed the patient a high risk for limb loss. However with proper infection control, the use of skin substitutes, negative pressure wound therapy and continued debridements, the limb was salvaged.

## References

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## Financial Disclosure

No financial interest to disclose.