

Complex lower extremity trauma wounds successfully treated with surgery, application of skin substitutes and negative pressure wound therapy (NPWT).

Rimi (Rimvydas) P. Statkus DPM*, FACFAS; Patrick A. McEneaney*, DPM, FACFAS, AAPWCA, Peter Lovato, DPM*, FACFAS

Northern Illinois Foot and Ankle Specialists, Crystal Lake, Illinois

Northwest Illinois Foot and Ankle Fellowship, Sycamore, Illinois

*Attending Physician Northwest Illinois Foot and Ankle Fellowship; Northern Illinois Foot and Ankle Specialists

Introduction

Complex trauma wounds can be difficult to treat. After stabilization of bony structures, treatment is focused to the neurovascular and soft tissue structures and their long-term viability after sustaining significant trauma. Infection is an ongoing concern, especially when large surface areas are involved.

The case presented highlights complicated wounds after high impact trauma and demonstrates successful wound healing with aggressive surgical management and multiple applications of fish skin grafts and negative pressure wound therapy (NPWT).

Methods

Case report includes a 59-year-old male patient who sustained a crush injury to his left leg when a retaining wall fell on him. Medical history includes obesity and obstructive sleep apnea. The patient sustained multiple non-displaced fractures to the left leg and foot, and extensive soft tissue loss to the medial left foot and ankle and proximal anterior tibia region. The patient had ongoing significant LLE swelling but was negative for compartment syndrome and was referred to the wound center for non-healing ulcers. Upon further evaluation, cellulitis, liquefactive necrosis at the ankle region and suspected abscess to the left plantar forefoot area was noted. The patient was admitted to hospital for infection work up and surgery.

Staged procedures were performed. Initial I&D drained the plantar abscess and bone biopsies were negative for osteomyelitis. Upon confirmation of negative bone/soft tissue infection and no recurrence of abscess formation, the patient underwent extensive wound preparation and application of meshed fish skin graft and NPWT. Micronized fish skin was placed in the previous abscess site.

Results



Figure 1: Initial presentation for second opinion with extensive necrosis and significant lower extremity edema.



Figure 2: After initial debridement, evidence of extensive liquefactive necrosis and suspicious for abscess formation. The patient was admitted for infection work-up.

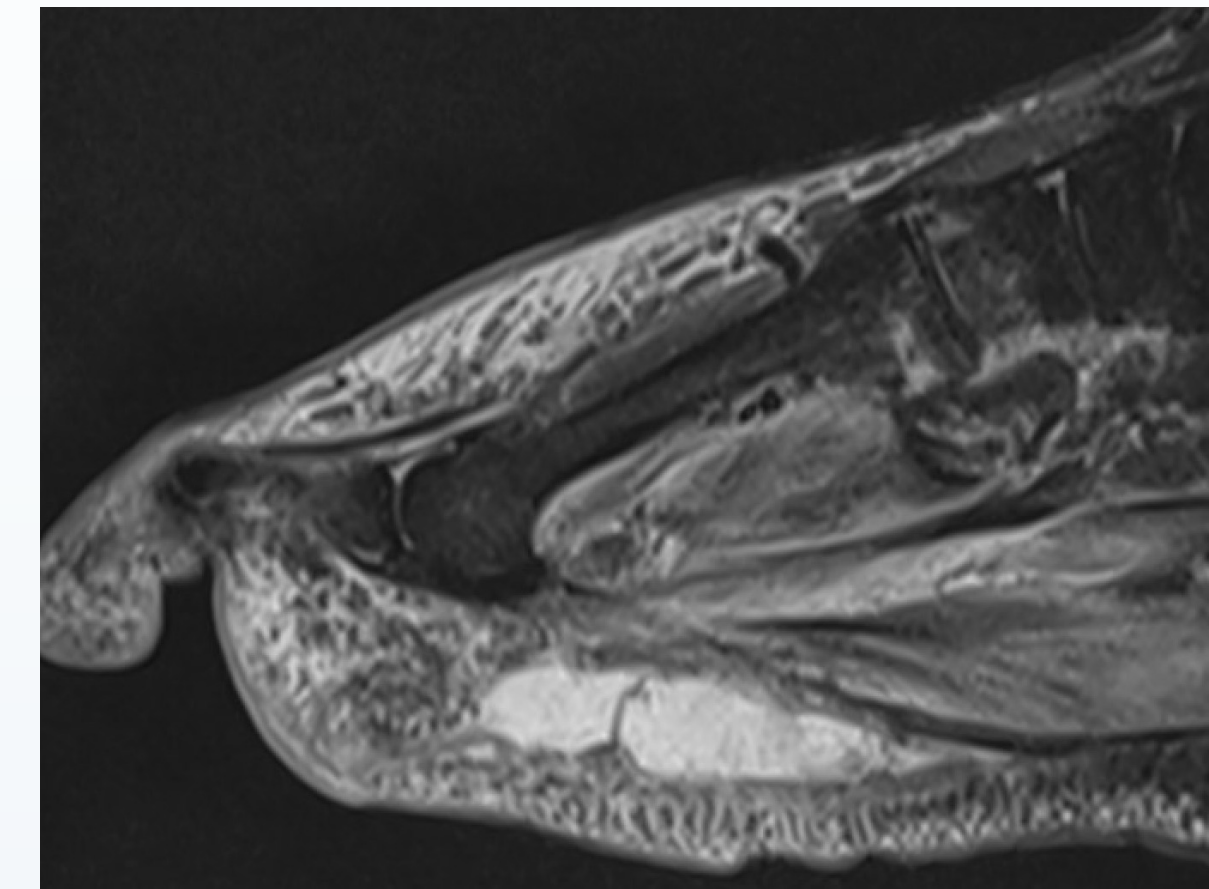


Figure 3: MRI confirmed an elongated subcutaneous abscess along the base of the foot, connecting to the surface medially at the ulceration/soft tissue defect. Initial surgery involved incision and drainage, extensive surgical wound debridement and bone biopsies. Antibiotics per Infectious Diseases recommendations.



Figure 4: After initial surgery and removal of all non-viable tissue and bioburden, clean granulating base was noted and confirmation of bone biopsies negative for osteomyelitis.



Figure 5: Application of skin substitute. With no further purulence noted, micronized fish skin graft was used to pack inside the large plantar abscess site.



Figure 6: Application of meshed fish skin graft reinforced with suture.



Figure 7: Application of skin substitute and NPWT (set continuous at 125 mmHg) to assist with rapid surgical wound closure.



Figure 8: The patient underwent weekly treatment in the wound center. Complete epithelialization was achieved within 12 weeks. The patient underwent

Discussion

Advanced adjunct therapies (application of fish skin graft) in combination with conventional wound therapy, including weekly wound debridement and application of NPWT three times weekly achieved complete healing. 80% reduction in wound size within 7 weeks. Complete closure within 3 months.

A combination of surgical intervention, application of skin substitute, NPWT and other advanced modalities are often required for patients with complex medical conditions for successful limb salvage. This case report exemplifies that a complete clinical picture needs to be considered with aggressive treatment when there is significant soft tissue loss after trauma.

References

1. Harding K, Carville K, Chadwick P, et al; Core Expert Working Group. WUWHs Consensus Document: wound exudate, effective assessment and management. Wounds Int. 2019.
2. Lullove EJ et al. A Multicenter, Blinded, Randomized Controlled Clinical Trial Evaluating the Effect of Omega-3-Rich Fish Skin in the Treatment of Chronic, Nonresponsive Diabetic Foot Ulcers. Wounds. 2021 Jul;33(7):169-177. doi: 10.25270/wnds/2021.169177. Epub 2021 Apr 14. PMID: 33872197.
3. Apelqvist J, Willy C, Fagerdahl AM, et al. EWMA document: negative pressure wound therapy –overview, challenges and perspectives. J Wound Care. 2017;26(Suppl 3):S1–S113.
4. Willy C. The Theory and Practice of Vacuum Therapy: Scientific Basis, Indications for Use, Case Reports, Practical Advice. Lindquist Publishing; 2006.
5. Paglinawan R, Schwab P, Bechert K. Novel Negative-Pressure Wound Therapy System Provides Accurate Pressure Delivery and Exceptional Fluid Handling Capability. Adv Skin Wound Care. 2021 Apr 1;34(4):176-178. doi: 10.1097/01.ASW.0000735212.52381.0f. PMID: 33739946