

Successful Limb Salvage Combining Revascularization Surgery with an Advanced Acellular Dermal Matrix (ADM) in Treating Multiple Non-Healing Diabetic Foot Ulcers

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Introduction

- The number of diabetics is projected to reach 439 million by 2030 or approximately 10% of the world's adult population.¹
- Up to 25% of diabetics are expected to have non-healing foot ulcers with the success rate for wound closure with standard of care ranging from 35-50% and taking an average 8 - 9.5 weeks.^{2,3}
- 85% of lower extremity amputations are preceded by a diabetic foot ulcer (DFU)^{1,2} equating to a limb being amputated somewhere in the world every 20 seconds.^{3,4}
- In Canada, the annual cost for treating non-healing DFU's is \$500 million.⁵
- In addition to the economic burden of non-healing DFU's leading to amputation, few diseases have a higher mortality rate reaching 30 - 50% after 2 years.⁶
- Over 65% of diabetic foot ulcers have an ischemic component, making vascular surgery an essential component to limb preservation.⁷
- **Even with re-vascularization and best standard wound care practices, significant challenges remain in healing DFU's and avoiding amputations.**

Aim

- We report on a case of a diabetic patient with multiple non-healing necrotic lesions on both feet.
- Aggressive standard treatments and surgeries were performed without success.
- A combination of revascularization and a Canadian developed advanced Acellular Dermal Matrix (ADM) was then used on the right foot to try to save the limb.

Methods

- A 75 year old male, Insulin dependent diabetic (over 10 years) initially presented with multiple necrotic ulcers to both his feet.
- *Right foot:* 1st digit medial, lateral foot at base of 5th toe, and heel ulceration (all dry gangrene). *Left foot:* 1st digit toe, and two on the 4th digit. Extensive vascular disease required a bypass to the posterior tibial artery that eventually failed and a posterior pedal loop reconstruction was performed. Unfortunately, the left foot was subsequently amputated due to severe infection.
- The right foot stopped healing and surgery was performed to re-open the pedal loop. The patient was also sent for hyperbaric oxygen therapy (HBOT). Very slow healing and periods of regression occurred over the next 8 months. Vessel re-occlusion and re-opening occurred a total of 4 times. Wounds persisted along with recurrent superficial infections. After a final repair of the bypass artery, the three ulcers present received an application of a Canadian advanced ADM (decellularized human dermis) material (Figure 1).
- Following standard of care procedures, each wound was debrided to provide a bleeding wound bed. A piece of ADM was applied by sizing to approximately 2-3 mm past the margins of the ulcer with the dermal side in contact with the wound bed.
- A non-adherent dressing (e.g. Mepilex) was used to cover the graft, followed by dry gauze or retentive dressing.

Results

- After application of the ADM graft, the patient was instructed to offload the foot and was seen weekly for follow-up and wound dressing changes.
- After 1 week, all ulcers had good uptake and integration of the ADM graft. (Figures 2,3,4).
- The heal ulcer was found to close after 10 days (Figure 2) and the lateral ulcer closed after 3 weeks post-treatment (Figure 3). The medial ulcer slowly healed and then presented with a necrotic central area. After debridement, a second ADM graft was applied and the ulcer closed 4 weeks later (Figure 4).

Figure 1

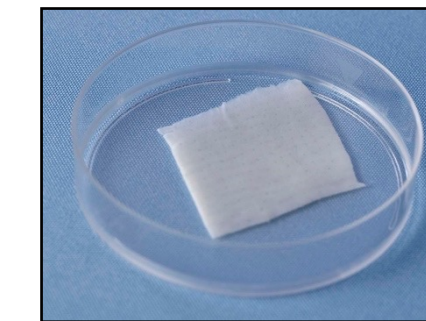


Figure 2

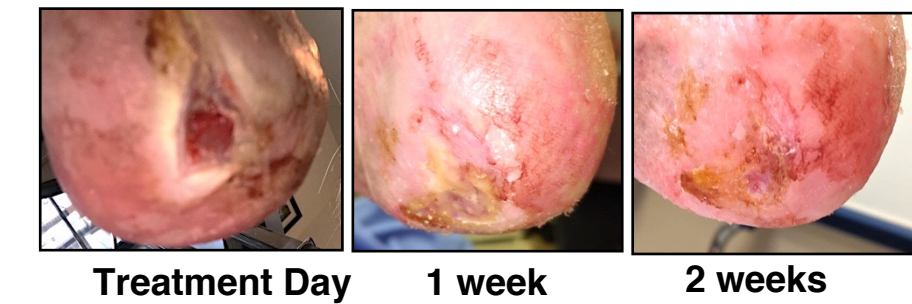


Figure 3



Figure 4



Clinical Significance

- This difficult case illustrates that providing adequate blood flow to a limb in combination with offloading, debridement and HBOT may not be enough to promote healing.
- The use of this new ADM graft to treat non-healing ulcers may help to provide the missing elements required to promote successful DFU healing.

References

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