Case Study: Single Application of Acellular Dermal Matrix Used as Successful Treatment of Complex Diabetic Foot Ulcers in Multiple Comorbidity Patient

Loan Lam, DPM, FAWPHc, FAPWCA, CWSP, CHWS, CLWT; United Vein & Vascular Centers, Tampa FL

INTRODUCTION

Diabetes is a group of metabolic disorders characterized by poor insulin secretion or impaired insulin function both leading to hyperglycemia. One of the long-term complications of diabetes is neuropathy. Neuropathy, particularly in the extremities, leads to poor sensation, which contributes to the occurrence of ulcers typically observed on the feet of diabetic patients.[1] Adding to the complexity of common diabetic complications, critical limb ischemia, the blockage of arteries in the lower extremities, can result in non-healing wounds.[2] The treatment of diabetic foot ulcers (DFUs), especially when additional comorbidities exist, remains a complex public health concern with both clinical and economic burden, requiring consistent assessment of technologies and modalities that could facilitate successful treatment. Current DFU treatments include wound dressing, hyperbaric oxygen therapy, negative pressure therapy, and in advanced cases, amputation of the limb.[3,4] An alternative treatment for DFUs is an acellular dermal matrix (ADM) that acts as a scaffold to support new tissue growth.[5] Human ADMs derived from consented deceased donors have been used for a variety of medical procedures, primarily involving wound healing, soft tissue reconstruction, and sports medicine applications.[6] The present case highlights the use of a human ADM in the treatment of complex DFUs in a multiple-comorbidity patient.

METHODS

The patient is an active 64-year-old Caucasian male who works in customer service remotely at home. He is an avid gardener and has multiple comorbidities including human immunodeficiency virus (HIV), non-insulin-dependent diabetes, peripheral arterial disease, peripheral neuropathy, and recurring cellulitis. Surgical history included fasciotomy of the upper extremity due to necrotizing fasciitis, partial right foot 5th ray resection due to chronic osteomyelitis and multiple debridements. Patient is a lifelong smoker and consumes alcohol 2 to 3 times weekly.

The patient was out in his garden on 10/1/2021 and stepped on a piece of splintered wood that punctured the plantar aspect of the left foot in the mid arch. As a result of the injury, there was arterial disruption of the metatarsal arteries of the plantar arch feeding through the 2nd and 3rd digits. The patient was admitted to the hospital where a partial 2nd and 3rd ray resection was performed and left open to heal via secondary intention. Negative pressure wound therapy (NPWT) was initiated. The patient underwent a successful lower extremity arterial revascularization to re-establish metatarsal arterial flow to the remaining digits. The patient was discharged to a skilled nursing facility and then home with NPWT to the surgical site and the plantar traumatic wound. As a result of an improperly placed NPWT dressing while in the skilled nursing facility, the patient developed a wound on the dorsal aspect of the foot. On 10/15/2021, the patient presented to the wound clinic for the intake visit. He was on intravenous and oral antibiotics that were managed by Infectious Diseases for a twelve-week course. Patient had been treated with a human umbilical cord graft with no success. Then, on 11/24/2021, Dermacell AWM® (LifeNet Health®, Virginia Beach VA) was applied to all three wounds after conservative sharp debridement bedside. The three wounds were the plantar midfoot wound, the open partial 2nd/3rd ray resection, and the proximal dorsal wound. Dermacell AWM was affixed to the wounds with sutures and covered with adaptic with NPWT until 12/15/2021. The dressings were changed twice weekly in clinic after using hydrogel to maintain a moist wound environment.

RESULTS

The plantar wound resolved by 1/14/2022 (7 weeks post application), the dorsal wound resolved by 2/4/2022 (10 weeks) and the 2nd/3rd resection resolved by 2/22/2022 (12 weeks), all with one single application of Dermacell AWM.

REFERENCES

1. Hozibal KB and Wukich DK. Diabetic foot infections: current concept review. Diabetic Foot Ankle. 2012;3:1-8
2. Chung J, Bartelson BB, Hiatt WR, Peyton BD, McLafferty RB, Hopley CW, Salter KD, Nehler MR. Wound healing and functional outcomes after infrainguinal bypass with reversed saphenous vein for critical limb ischemia. J Vasc Surg. 2006 Jun;43(6):1183-90.
3. Gupta S, Bates-Jensen B, Gabriel A, Holloway A, Niezgoda J, Weir D. Differentiating negative pressure wound therapy devices: an illustrative case series. Wounds. 2007;19(1):1-9
4. Zamboni WA, Wong HP, Stephenson LL, Pfeifer MA. Evaluation of hyperbaric oxygen for diabetic wounds: a prospective study. Undersea Hyperb Med. 1997;24(3):175-179
5. Wainwright DJ, Bury SB. Acellular Dermal Matrix in the Management of the Burn Patient. Aesthet Surg J. 2011;31(7):13S-23S

CONCLUSIONS

The utilization of human ADM proved successful in the treatment of challenging and chronic wounds with only one application and should be considered as viable therapy for complex wounds.

10/19/2021 – Presenting photograph showing open partial 2nd/3rd ray resection and plantar puncture wounds

11/24/2021 – Open partial 2nd/3rd ray resection wound prior to Dermacell AWM application

11/24/2021 – Dermacell AWM application to the partial 2nd/3rd ray resection wound

11/24/2021 – Initial dorsal wound prior to debridement and application of Dermacell AWM

11/24/2021 – Dermacell AWM application to the plantar puncture wound

11/24/2021 – Dermacell AWM application to the dorsal aspect of the 2nd/3rd ray resection wound

1/14/2022 – Plantar wound resolved and remained closed at the next visit of 2/4/2022

2/4/2022 – Small scab remains; Partial 2nd/3rd ray resection wound fully resolved

2/4/2022 – Dorsal aspect of partial 2nd/3rd ray resection wound healed

2/4/2022 – Dorsal wound resolved

©2023. ALL RIGHTS RESERVED.
LifeNet Health and Dermacell AWM are registered trademarks of LifeNet Health.

The Wound Clinic at United Vein & VASCULAR CENTERS