

A Backup Plan for Plastic Surgical Reconstruction when Plan A Fails: Use of Aseptically Processed Meshed Reticular Acellular Dermal Matrix in Soft Tissue Reconstruction

Michael N. Desvigne, MD, FACS, CWS, FACCWS; Krista Bauer (Montgomery), RN, WCC, OMS; Jody Wolfe, BSN, MBA, RN; CWOCN, Ashley L. Wardman, LPN.
Plastic & Reconstructive Surgery, Wound Care & Hyperbaric Medicine, Abrazo Arrowhead Hospital and Wound Clinic, Glendale, AZ

INTRODUCTION

Flap mobilization and closure is the mainstay of treatment in soft tissue reconstruction. Successful outcomes are only achieved when there is adequate tissue for transfer. When there is a relative tissue deficiency, needed procedures may become more challenging and complex such as free tissue transfer, and outcomes may be compromised, resulting in flap failure.

Aseptically processed meshed human reticular acellular dermal matrix (HR-ADM)* is unique in that it comes from the reticular dermal layer that provides an open network structure to support tissue ingrowth and serve as a scaffolding. While these tissue forms are known to assist with soft tissue support for secondary healing or split thickness grafting, this dermal matrix may also be used as an adjunct to flap transfer which may then allow for coverage of vital structures if flap failure occurs, perhaps reducing the need for additional surgery and or more complex procedures.

METHODS/RESULTS

We evaluated 5 cases of soft tissue reconstruction (2 are presented here) where there was a paucity of tissue for flap transfer and or concern for flap failure resulting in exposure of vital structures such as bone, tendon or vascular graft. Wound etiologies included pressure ulcerations of the trunk (n=3), full thickness necrosis of the groin (n=1), and a diabetic foot ulcer (DFU) in a poorly perfused lower extremity (n=1). Aseptically processed meshed HR-ADM was placed prior to flap inset to serve as a scaffolding to support tissue ingrowth following flap transfer. Postoperatively incisional management was supported with dehydrated human placental mini-membrane** and negative pressure therapy. In this series of cases, postoperative complications occurred including dehiscence n=4 and flap failure due to poor perfusion. Despite the postoperative complications, incorporation of the meshed HR-ADM allowed delayed primary closure n=2, secondary healing n=3. The DFU case was noteworthy as a failed tarsometatarsal amputation (TMA) that occurred in a poorly perfused lower extremity after the meshed HR-ADM had been placed prior to the TMA. Following flap failure, secondary healing was successful without need for more proximal amputation.

DISCUSSION

Meshed HR-ADM has properties that allow tissue integration and incorporation. Patients with soft tissue deficits requiring flap reconstruction may benefit from meshed HR-ADM for additional support and may serve as a backup to allow for coverage of vital structures. While distant flaps and free tissue transfer are still considered the standard of care, these procedures may carry a higher risk of complications and or failure. The use of meshed HR-ADM in these patients may help create a scaffolding for tissue incorporation to allow for coverage of vital structures, reducing the need for more complex surgical intervention.

CASE 1

Patient Information: 42 year old female with incomplete quadriplegia from GSW. Presented with necrotic sacral ulcer, stage 4. Seen and managed at outside wound clinic with progressive worsening ulcer. Admitted for surgical intervention.

Medical History: Urostomy

Social History: Lives independently

Treatment: Taken to OR for excision ulcers and flap closure. Meshed HR-ADM placed for tissue scaffolding. Human Placental Mini-Membrane Allograft placed to optimize healing. NPT initiated for incisional management immediately following closure.

Outcome: Dehiscence at 3 weeks. Meshed HR-ADM incorporated. Closure performed.



Figure 1A. Wound at initial presentation (Day 1)



Figure 1B. Placement of dehydrated human placental mini-membrane (Day 1)



Figure 1C. Placement of meshed HR-ADM (Day 1)



Figure 1D. Flap Closure



Figure 1E. Flap dehiscence. Dermal matrix incorporated. (Day 21)



Figure 1F. Secondary closure performed (Day 21)

CASE 2

Patient Information: 79 year old female s/p percutaneous Aortic valve repair complicated by bleed and hematoma right groin resulting in full thickness necrosis.

Medical History: Aortic valve stenosis, CHF, HTN, Obesity

Treatment: NPWTi-d initiated. Taken to OR for staged debridement and NPWTi-d. Taken to OR for definitive flap closure. Meshed HR-ADM placed for tissue scaffolding, and just in case Plan A fails. Human Placental Mini-Membrane Allograft placed to optimize healing. NPT initiated for incisional management immediately following closure.

Outcome: Dehiscence at 4 weeks. Meshed HR-ADM incorporated. Closure performed at 6 weeks.



Figure 2A. Full thickness necrosis groin (Day 1)



Figure 2B. Applied 3M™ V.A.C. Veraflo Cleanse Choice™ (Day 1)



Figure 2C. Eschar removed (Day 3)

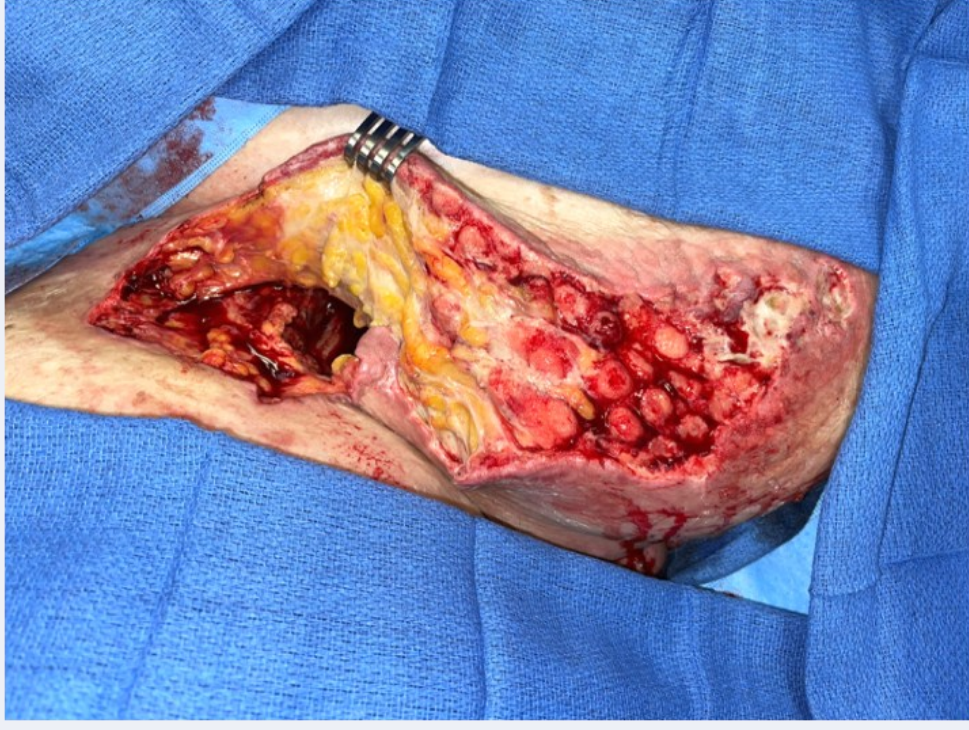


Figure 2D. Continued to remove non-viable tissue (Day 5)

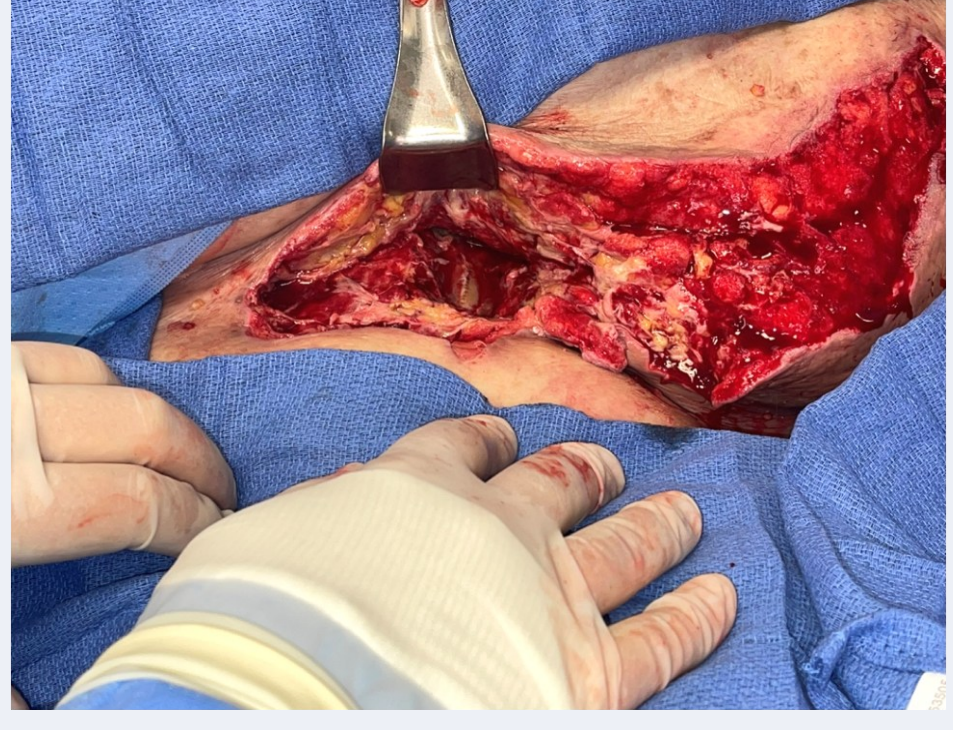


Figure 2E. Cavity went down to vessel. Applied 3M V.A.C. Whitefoam dressing to protect vessel in combination with 3M V.A.C. Veraflo Cleanse Choice dressing with hypochlorous acid solution. (Day 7)

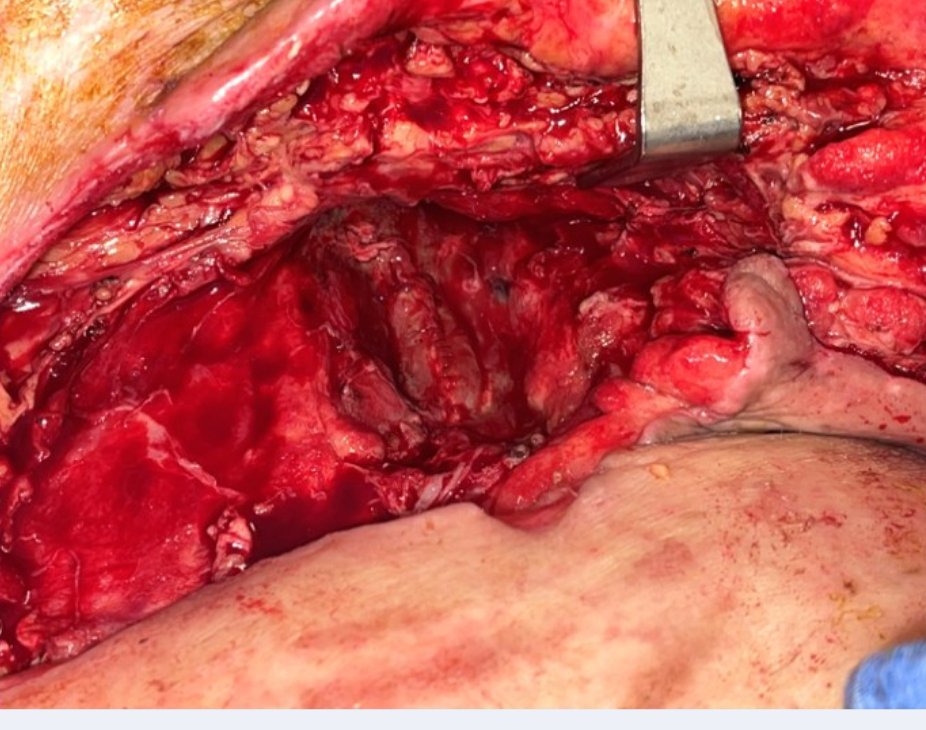


Figure 2F. Femoral artery exposed (Day 10)



Figure 2G. Applied placental mini-membrane allograft (Day 14)



Figure 2H. Applied meshed HR-ADM and traditional 3M™ V.A.C.® Therapy (Day 14)



Figure 2I. Staged layer closure to protect the vessel. Then applied 3M™ Prevena™ Customizable Dressing for 7 days. (Day 14)



Figure 2J. Small dehiscence (Day 26)



Figure 2K. Progressive dehiscence. Deep soft tissue exposed. Dermal matrix fully incorporated. (8 weeks)



Figure 2L. Returned to OR for irrigation and closure (8 weeks)

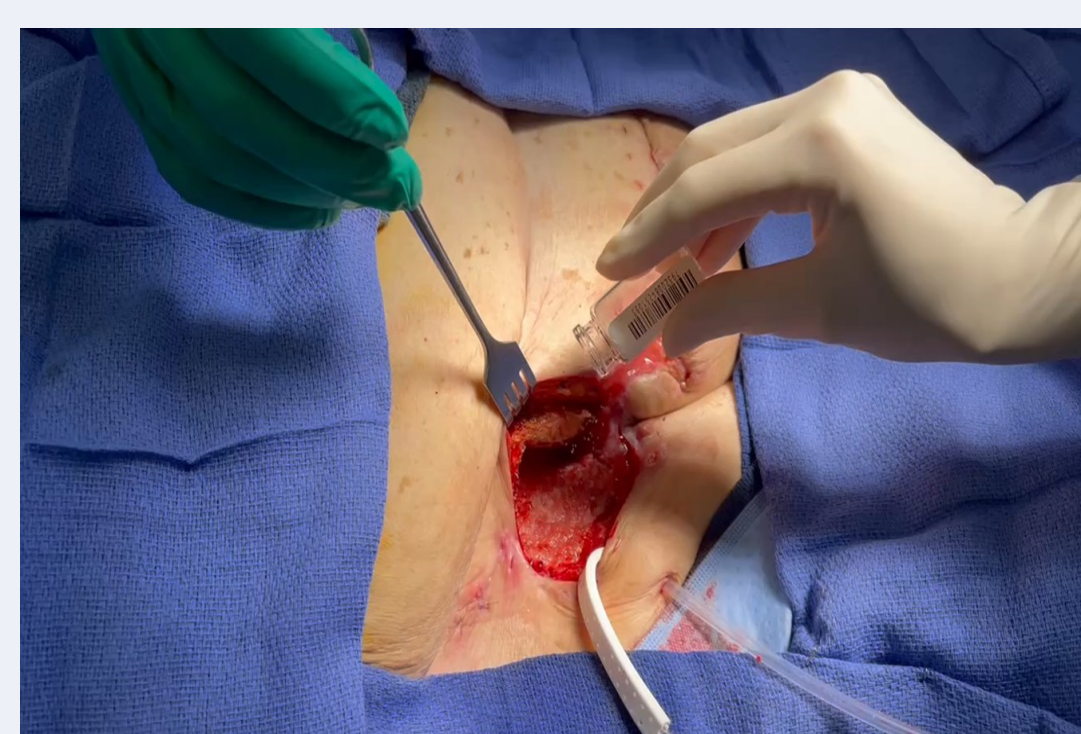


Figure 2M. Applied human placental mini-membrane allograft (8 weeks)



Figure 2N. Surgical closure (8 weeks)



Figure 2O. NPT placement for incisional management (8 weeks)



Figure 2P. Healed (3 months)

REFERENCES

1. Labropoulos, N Wang, E, T. Lanier, T, B.S.Sami U. Khan,U, Factors Associated with Poor Healing and Recurrence of Venous Ulceration Plast. Reconstr. Surg 2012; 129(1):179-186.

2. Golger A, Ching S, Goldsmith C, Penny R, Bain J: Mortality in Patients with Necrotizing Fasciitis. Plast. Reconstr. Surg 2006; 119(6):1804-1807.

3. DiDomenico LA, Orgill DP, Galiano RD, et al. Use of an aseptically processed, dehydrated human amnion and chorion membrane improves the likelihood and rate of healing in chronic diabetic foot ulcers: A prospective, randomized, multi-centre clinical trial in 80 patients. Int Wound J 2018; 15: 950-957.

4. Zelen CM, Orgill DP, Serena TE, et al. An aseptically processed, acellular, reticular, allogenic human dermis improves healing in diabetic foot ulcers: A prospective, randomized, controlled, multicenter follow-up trial. Int Wound J 2018: 1-9

***Somagen® Reticular Dermal Matrix (MTF Biologics, Edison, NJ)**

****Salera® Placental Allograft (MTF Biologics, Edison, NJ)**