

A retrospective review of soft tissue reconstruction in volumetric soft tissue defects

Abigail E. Chaffin¹ (MD, FACS, CWSP, FAPWCA), James Christopher² (MD) and Bariqa Salah³ (MD)

¹Department of Surgery, Division of Plastic Surgery, Tulane, University School of Medicine, 1430 Tulane Avenue, New Orleans, Louisiana 70112, USA; ²Private Practice, General Surgeon, 233 St Ann Dr Suite 3, Mandeville, LA 70471; ³Jordan University Hospital, Amman, Jordan

INTRODUCTION

There are a variety of diagnoses that require the surgical debridement of nonviable tissue and result in a volumetric soft tissue defect. These wounds will typically reveal exposed muscle, bone, tendon, and vasculature that require coverage with a dermal layer prior to skin grafting. In some cases where flap procedures are inappropriate or not possible, dermal matrices represent an alternative reconstructive option for these volumetric soft tissue defects. With dermal matrices becoming increasingly available and technologically advanced, we evaluated an ovine derived extracellular matrix graft (OFM) in the reconstruction of these defects. In addition to the OFM sheet grafts[^], a morselized or powdered OFM⁺ product was used to facilitate an increase in the surface area contact of the OFM products with these irregular wound beds.

METHODS

Three cases of soft tissue defects exhibiting volumetric soft tissue loss underwent reconstruction using an OFM graft and morselized OFM as a dermal matrix. Grafts were fixed directly into defects for immediate coverage and subsequently temporized defects via granulation tissue formation for later skin graft or secondary closure. Defect granulation and epithelialization were monitored until closure and the final aesthetic and functional outcomes were evaluated.

RESULTS

Complete granulation of the graft was achieved in two of the three cases. Granulation tissue resulting from the graft was suitable for skin grafting or flap reconstruction, with complete reepithelialisation in two weeks where a skin graft was applied to the wound bed. Patients were satisfied with the outcomes achieved.

CONCLUSION

The present series highlights the use of an extracellular matrix sheet and morselized graft for the reconstruction of defects with volumetric soft tissue loss. While such dermal matrices do not supersede or replace flap procedures, they represent an alternative option on the reconstructive ladder in cases where flap procedures are not appropriate or possible.

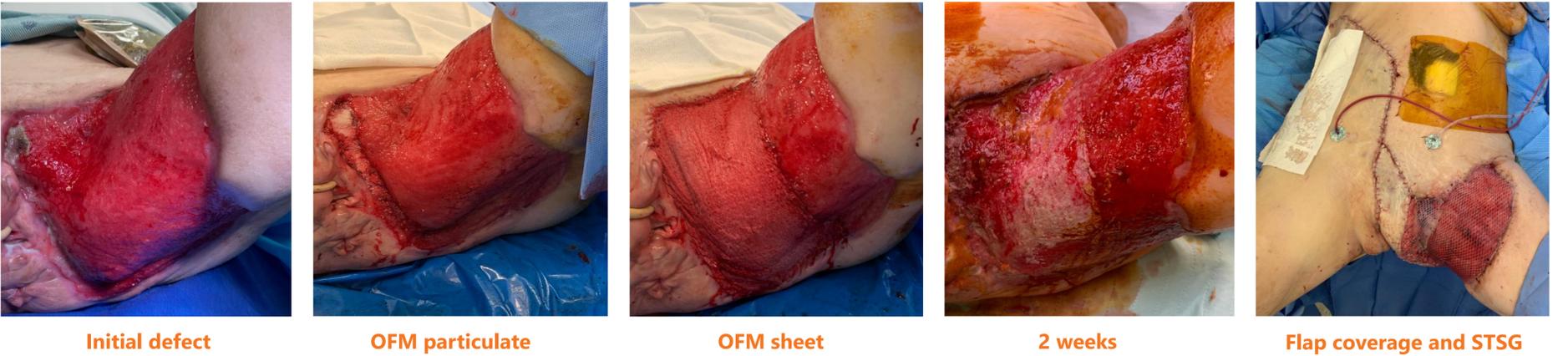
REFERENCES AND DISCLOSURES

AEC has received an educational grant from Aroa Biosurgery Limited. [†]Myriad Morcells, Aroa Biosurgery Limited, New Zealand. [^]Myriad Matrix, Aroa Biosurgery Limited, New Zealand. ^{*}Endoform Natural, Aroa Biosurgery Limited, New Zealand.

TABLE 1. PATIENT DEMOGRAPHICS AND STUDY OUTCOMES				
Sex/Age	Comorbidities	Patient History	Area	Intervention and Outcomes
F, 57	• DM	<ul style="list-style-type: none"> • NSTI to the perineal and left thigh area. • Underwent several debridements at an outside hospital. At the time of presentation there was necrotic exposed pubic and ischial bone as well and exposed femoral vasculature • Wound type: Full thickness wound with exposed bone and vasculature 	~ 20 x 20 cm	<ul style="list-style-type: none"> • Two debridements then placement of both OFM sheet graft and OFM particulate • Exposed bone and vasculature covered by 2 weeks ->STSG and rotational soft tissue flap • 90% STSG take at 1 week • No infection, no complications
M, 52	<ul style="list-style-type: none"> • DM • ESRD on HD 	<ul style="list-style-type: none"> • Bilateral lower extremity calciphylaxis wounds, worsening over 6 weeks • Developed purulence drainage from wounds and necrotic areas • Wound type: Full thickness wound with exposed fascia 	Left leg: ~30 x 20 cm Right leg: ~30 x 20 cm	<ul style="list-style-type: none"> • Bilateral debridement's and placement of OFM sheet graft with a silver contact layer and NPWT • Grafts 40% granulated by week 3; elected to transition to hospice • No infection, no complications • Placement of OFM sheet graft with NPWT. Graft fully integrated by day 10 • Repeat application of OFM sheet graft. Fully integrated within 10 days. • Utilized OFM single layer for 3 weeks then placement of STSG • 100% STSG take 1 week post op • Fully healed by week 9 from initial application
F, 58	<ul style="list-style-type: none"> • CKD • Paraplegic 	<ul style="list-style-type: none"> • Greater than 6-month-old pressure injury that had failed multiple prior surgeries including a free flap. • Significant undermining and tunneling • Wound type: Full thickness wound down to muscular fascia 	~40 x 20 x 5 cm	<ul style="list-style-type: none"> • Placement of OFM sheet graft with NPWT. Graft fully integrated by day 10 • Repeat application of OFM sheet graft. Fully integrated within 10 days. • Utilized OFM single layer for 3 weeks then placement of STSG • 100% STSG take 1 week post op • Fully healed by week 9 from initial application

Necrotizing Soft Tissue Infection

57-Year-old female presented from an outside hospital due to an ongoing necrotizing soft tissue infection of the left perineum and thigh. The patient had several debridements prior to arrival. During the debridements there was an injury to the femoral vasculature resulting in a vascular paralysis and exposed femoral vessels. In addition to the exposed vasculature the patient had exposed necrotic pubis and ischial tuberosity. The patient underwent another debridement and then subsequent placement of OFM particulate over the exposed pubic and ischial bone. This was followed by the application of an OFM sheet graft with a silver contact layer and gauze pads. The patient was taken back to the OR 1 week after the initial application of the OFM products for a dressing change and repeat evaluation of the wound bed. The OFM particulate was integrating over the ischial tuberosity well and the exposed pubic bone coverage was improved but there were areas of necrotic bone that required a repeat debridement. The OFM sheet graft had integrated well and there was no evidence of complications or infection. After the subsequent debridement, there was an additional application of OFM particulate over the exposed pubic bone and the "trough-like" defect down to the ischial tuberosity. This was followed by an additional application of OFM sheet graft[^] to cover the majority of the remaining thigh wound. At 2 weeks after the initial application there was healthy granulation tissue over all of the exposed vital structures. The wound was healthy in appearance and was prepped for a right oblique rectus flap with a STSG to the remaining thigh wound. At 1 week post STSG placement there was 90% STSG graft take.



Pressure Ulcer

58-year-old female with a 6-month history of a pressure ulcer. Patient had a failed free flap surgery leading to a wound that was ~40 x 20 x 5 cm in size. There was significant tunneling on the inferior portion of the wound and additional undermining along the superior portion. After a thorough debridement OFM sheet graft was placed into the tunneled portion (see arrow) and then on top of the wound bed. This was stapled in place then a contact layer was added and NPWT. On postoperative day 10 the OFM sheet graft was fully integrated, and the depth of the wound was significantly reduced. An additional application of OFM sheet graft was applied and NPWT was continued. By three weeks from the initial application the wound depth was relatively filled in and the wound size had decreased significantly. OFM single layer* was placed in the wound and then NPWT was continued. By 6 weeks the wound size had decreased by ~75% and a STSG was placed. At 9 weeks post op the wound was fully epithelized.

