Single-patient portable Negative Pressure Wound Therapy (NPWT) device decreases hospital costs for a Single-stage biomatrix and skin graft technique

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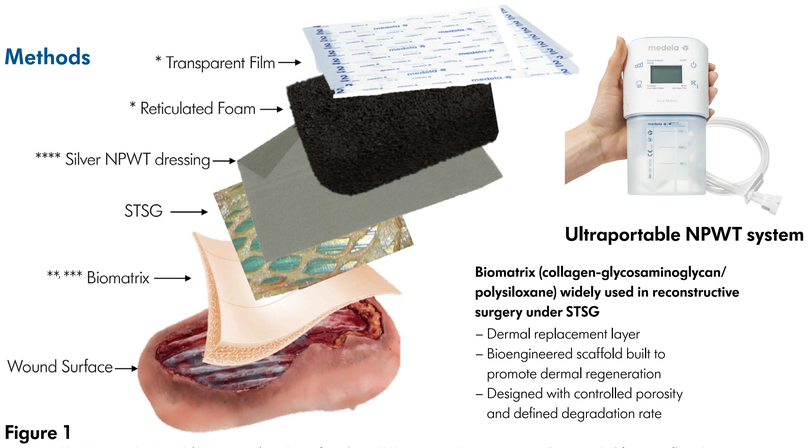
Introduction & Aim

We assess the economic savings when using a single-stage, single-patient NPWT* system over an advanced biomatrix** and skin graft for accelerating the wound healing process by avoiding a second operation and evaluating ease of transition from inpatient to outpatient status. Advanced biomatrix* is normally performed as a 2-stage procedure, with one operation to place the biomatrix*, and then another performed in 3 weeks for the STSG. We demonstrate our technique and results in 10 consecutive patients.

Methods



Ultraportable NPWT system

Biomatrix (collagen-glycosaminoglycan/ polysiloxane) widely used in reconstructive surgery under STSG

- Dermal replacement layer
- Bioengineered scaffold built to promote dermal regeneration
- Designed with controlled porosity and defined degradation rate

Figure 1

Biomatrix**, STSG, and NPWT* (-125mmHg) and interface layer**** were used to reconstruct large radial forearm flap donor sites. Wound and Graft Size, STSG/biomatrix take, therapy duration, hospital length of stay (LOS), and infection rate were assessed on a series of 10 consecutive patients.

Radial Forearm Donor Site

Advantages

Aesthetics
Thin Skin
Color

Function
Tendon Gliding
Protection over RSN
Take of STSG/Wounds

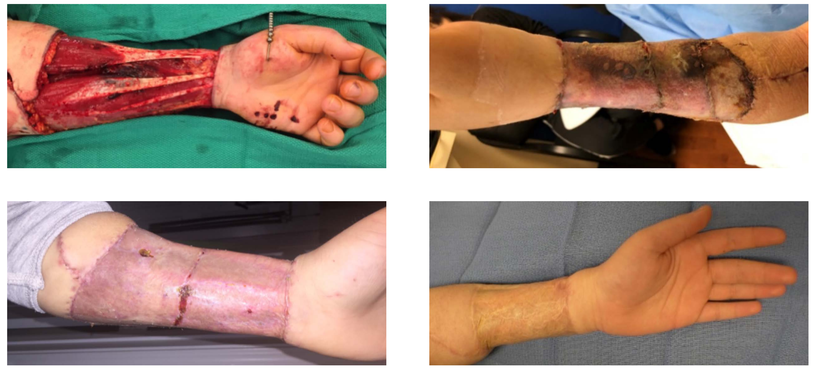


Figure 2 (A–D)

Unique NPWT System

Biomatrix*, STSG, and NPWT* (–125 mmHg) were utilized in patients for complex radial forearm free flap donor site reconstruction in a single-stage procedure. We assessed the cost stemming from the single stage-procedure versus the standard 2-stage procedure.**

Figure 3
Ultra portable device and NPWT dressing

Management: Reconstruction of large forearm flap donor site

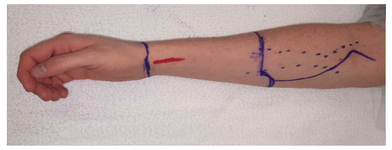


Figure 4 A

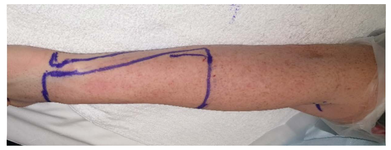
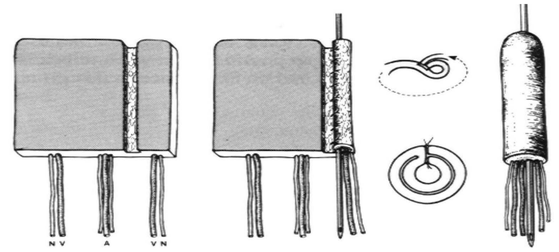


Figure 4 B

RADIAL FOREARM PHALLOPLASTY: TUBE WITHIN A TUBE



A large skin surface area was needed for phalloplasty, taken from the forearm (Figure 2A and 2B). This was used to construct a "Tube within a Tube".

Results: Improved cosmesis and function

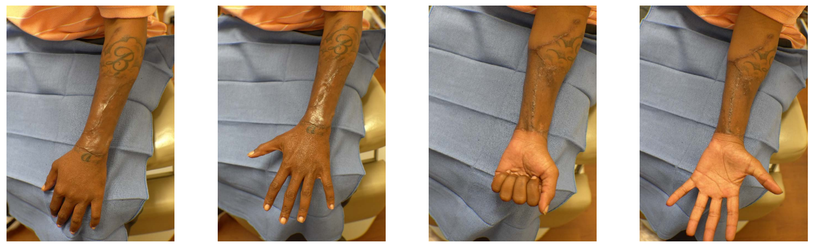


Figure 5 (A–D)

Table 1: Radial Forearm Donor Site Management Cost Comparison

	Standard Protocol	New Protocol
Operation 1	Biomatrix + NPWT	Biomatrix + STSG + NPWT
LOS (days)	5–7(§)	5
Cost of Hospital stay	$ 1,500 x 5days = $ 7,500	$ 1,500 x 5days = $ 7,500
(§) Potential Cost of delay in discharge of patient to obtain home NPWT (1–2 days)	**Estimated Cost $ 1,500/day**	No delay: patient discharged with the Single Use, Portable NPWT applied in the hospital
Outpatient STSG surgery	POD 14 days	No
Operations	2 separate	1
Costs of Additional Outpatient Surgery, Hospital, Surgeon & Anesthesia Fees	**$ 10,000**	No second surgery required
Total NPWT (days)	21	10–14 (mean 12)
Results	Good	Good
Total Costs	**$ 17,500–$ 20,500**	$7,500
Added benefits	– – – –	* No painful removal of NPWT * Uninterrupted NPWT * Patient satisfaction +++ *** Significant cost savings ($10,000–$13,000)**

Results and Conclusion

Patients treated with the single-stage biomatrix, STSG, and NPWT therapy discharged on postoperative day 5. Transitioned from inpatient status to the outpatient/home setting and had the NPWT device removed in 10–14 days.
Mean graft take was 98 % with no infections and second operation was not necessary for the STSG with no delay in discharge. The cost of second STSG operation ($10,000) and potential 1–2 days in hospital for discharge ($1500/day) was avoided. Conclusions: Single-stage biomatrix*, STSG, and NPWT* results in successful reconstruction of large, complex radial forearm free flap donor sites used in phalloplasty. Using the portable, single-patient NPWT device allows for easy discharge of the inpatient and avoids a costly, second operation to place a STSG. The single-stage procedure can be considered a superior, cost-effective alternative to the current 2-stage procedure.**

Notes:

Product notation:
* Invia® Motion™ NPWT system,
** Integra® Mono Layer (Thin) Wound Matrix,
*** Integra Bi Layer Wound Matrix,
**** Invia Silverlon

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Although the manufacturer's instructions for use with the NPWT system* recommends a dressing change every 48–72 hours, the primary researcher in this study has been investigating extended times between NPWT dressing changes in the management of wounds and has experience with extended dressing change times together with an antimicrobial wound contact layer**** and therefore applied extended dressing change times commensurate with this experience.

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