

# A Retrospective and Comparative Analysis of the Effects of Negative-Pressure Wound Therapy with a Meshed Bilayer Wound Matrix on Complex Extremity Wounds



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## Introduction

The treatment of extremity wounds with tendon or bone exposed is technically challenging. Skin grafting is contraindicated and free flap procedures are long and require use of specialized micro-instrumentation for these types of wounds.<sup>1</sup> Acellular dermal matrices (ADMs) provide alternative reconstructive options to surgeons.<sup>2,3</sup> The use of ADMs, such as meshed bilayer wound matrix (MBWM), in combination with negative-pressure wound therapy (NPWT) has shown promise in the treatment of complex extremity wounds, in case reports and small case series. We hypothesize that the combination of MBWM and NPWT would have a positive synergistic effect for the management of complex extremity wounds.

## Methods

All patients gave informed written consent for the use of the data collected. We conducted a 5-year retrospective review to compare the use of MBWM followed by split-thickness skin graft (STSG) combined with NPWT versus MBWM, followed by STSG, alone for the management of these wounds.

## Inclusion criteria:

- Aged between 18 to 80 years (Jan 2015 to Dec 2019)
- Lower extremity wound requiring coverage with MBWM

## Outcome assessments:

- Autograft take rate
- Reapplication rate
- Complications

## Results

- 109 patients met the inclusion criteria and were included in the study. Patients' information is summarized in table 1 and two cases of wounds managed with or without NPWT are shown in figure 1.

**Table 1. Patient and wound characteristics**

|                                   | NPWT group (n=62) | No-NPWT group (n=47) | P    |
|-----------------------------------|-------------------|----------------------|------|
| Age, year, mean (SD)              | 45.5 (16.4)       | 44.7 (14.8)          | 0.79 |
| Gender, male, n (%)               | 19 (30.1)         | 18 (38.8)            | 0.40 |
| Diabetes, n (%)                   | 18 (29.0)         | 14 (29.8)            | 0.93 |
| Smoking, n (%)                    | 25 (40.3)         | 18 (38.3)            | 0.83 |
| <b>Wound characteristics</b>      |                   |                      |      |
| Etiology, trauma, n (%)           | 60 (96.8)         | 44 (93.6)            | 0.44 |
| Size, cm <sup>2</sup> , mean (SD) | 8.9 (4.0)         | 8.6 (5.5)            | 0.39 |
| <b>Wound location, n (%)</b>      |                   |                      |      |
| Forearm                           | 45 (72.6)         | 30 (63.8)            |      |
| Leg                               | 10 (16.1)         | 9 (17.0)             |      |

- The most common etiology was trauma.
- Wounds were primarily located on the forearm, legs and arms.

**Table 2. Outcome assessments at 3 months**

|                             | NPWT group (n=62) | No-NPWT group (n=47) | P    |
|-----------------------------|-------------------|----------------------|------|
| MBWM take rate, n (%)       | 60 (96.8)         | 43 (91.4)            | 0.20 |
| STSG take rate, n (%)       | 60 (96.8)         | 40 (85.1)            | 0.03 |
| Reapplication, n (%)        | 2 (3.2)           | 7 (14.9)             | 0.03 |
| <b>Complications, n (%)</b> |                   |                      |      |
| Exposed facia               | 0 (0)             | 2 (4.25)             |      |
| Exposed tendon              | 2 (3.2)           | 2 (4.25)             |      |
| Infection                   | 0                 | 3 (6.4)              |      |

**Figure 1. Treatment of extremity wounds with MBWM in combination with or without NPWT**



- There were a significantly:
- 1) greater take of MBWM+STSG with NPWT (96.8%) compared without NPWT (85.1%, p=0.03) at 3 months,
  - 2) fewer reapplications of the MBWM in the NPWT group (3.2%) versus the no-NPWT group (14.9%, p=0.03),
  - 3) fewer postoperative complications, prior to STSG, in the NPWT group (3.2%) versus the no-NPWT group (14.9%).

## Conclusions

- The combination of use of MBWM with NPWT leads to an overall higher success rate for the management of complex extremity wounds.
- The use of MBWM in combination with NPWT has the potential to improve both surgical procedures and patient outcomes for these patients.