Use of Disposable Negative Pressure Wound Therapy in 16 Podiatry Clinic Patients with Chronic Wounds

[1,2]Robert Klein, DPM, FACFAS, CWS, FFPM RCPS (Glasgow); [1]Rhea Mathew, BS, Medical Student; [1]Daniel J. Spangler, BS, Medical Student; [3]Hadley Hudson, Undergraduate Student; [4]Laura Soloway, PhD, MPH; [5]Christine Bongards, PhD

Background

- Disposable mechanical negative pressure wound therapy (dNPWT*) can be used to manage lower extremity wounds in the outpatient clinic.
- This small dNPWT device provides negative pressure while allowing the patient to maintain ambulation as the dNPWT device can be worn underneath clothing.

Purpose

- We examined the use of dNPWT in 16 patients at a podiatry clinic and assessed wound healing and the development of granulation tissue.

Methods

- This retrospective case series assessed the use of dNPWT followed by advanced wound dressings in 16 patients with chronic wounds.
- Patients were treated from October 31, 2019 to December 16, 2021.
- All patients received dNPWT treatment.
- dNPWT dressings were changed every 2-3 days.
- Standard of care dressings (SOC) or Oxidized regenerated cellulose (ORC)/collagen (C)/ ORC-silver dressings† were utilized, if necessary, after dNPWT was discontinued.
- Demographics, baseline wound measurements, and subsequent wound visit data and treatments were recorded.
- The outcome measures included area, volume, duration of treatment, and healing status.

Results

- The average age of the study patients was 59.6 years old at baseline and average body mass index (BMI) was 35.5 kg/m^2.
- Multiple comorbidities were present, including poor nutritional status, diabetes, hypertension, and coronary artery disease (**Table 1**).

Results (Cont'd)

- Wound mix consisted of diabetic foot ulcers (DFU), surgical wounds, and pressure injury (PI) (**Table 1**).
- Approximately 50% of patients required amputation prior to wound treatment.
- Baseline wound characteristics included an average wound age of 15.6 weeks, average wound area of 5.46 cm^2, and average wound volume of 3.32 cm^3.
- The average time from presentation to end of dNPWT treatment was 45.5 days.

Table 1. Patient demographics

Characteristic	Study population (n=16)
Age (average years ± SD)	59.6 ± 8.9
Gender (n, %)	
Male	8 (50.0%)
Female	8 (50.0%)
BMI (average kg/m^2 ± SD)	35.5 ± 8.2
Comorbidities (n, %)	
Tobacco Use	10 (62.5%)
Current	3 (18.75%)
Former	7 (43.75%)
Poor Nutrition Status	16 (100%)
Diabetes	15 (93.75%)
Hypertension	14 (87.5%)
CAD	8 (50.0%)
PAD	4 (25.0%)
Autoimmune Disorder	3 (18.75%)
COPD	1 (6.25%)
Wound Type (n, %)	
Surgical	9 (56.25%)
DFU	6 (37.5%)
Pressure Injury	1 (6.25%)

CAD= Coronary artery disease; COPD= Chronic obstructive pulmonary disease; DFU= Diabetic foot ulcer; PAD= Peripheral arterial disease; SD= Standard deviation

- **Table 2** shows the duration of treatment and number of days per application of product and SOC.
- A reduction in average area and volume was observed with dNPWT use (**Figures 1-2**).

Results (Cont'd)

- Within the dNPWT treatment time frame, 81% of wounds showed an increase in granulation tissue amount, 69% showed wound area reduction, and 81% showed wound volume reduction.
- By the end of follow-up, 56% had healed wounds and 31% had wounds almost completely healed (**Figure 3**).
- Representative cases are shown in **Figures 4-5**.

Table 2. Duration of dNPWT and standard of care dressing use

Characteristic	Study population (n=16)
Total Treatment Length (average days ± SD)	128.6 ± 67.4
dNPWT Treatment Length (average days ± SD)	22.3 ± 12.4
dNPWT Office Visits (average n ± SD)	8.4 ± 5.0
Time between dNPWT dressing changes (average days ± SD)	3.1 ± 2.0
SOC Treatment Length (average days ± SD)	106.3 ± 67.0
Number of SOC Dressing Changes (average n± SD)	11.3 ± 9.9
Time between SOC Dressing Changes (average days ± SD)	12.7 ± 6.6

SD= Standard deviation; SOC= standard of care dressings

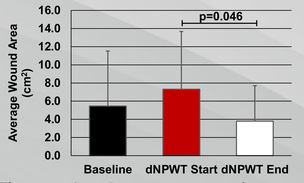

Figure 1. Average wound area reduction.

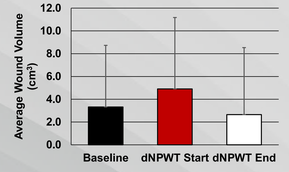

Figure 2. Average wound volume reduction.

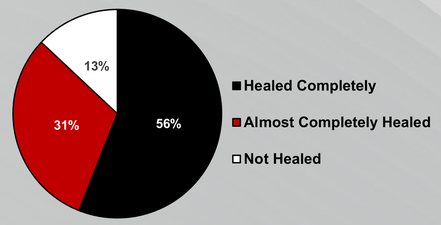

Figure 3. Wound outcomes

Representative Cases

- **Surgical Wound.** Surgical wound following amputation. A hydrocolloid ring was applied during dNPWT application to help maintain a negative pressure seal. Wound care included dNPWT (21 days) and ORC/C/Silver-ORC dressings (28 days). The wound was fully healed 49 days after presentation.

Figure 4A. Wound at presentation

Figure 4B. Application of dNPWT

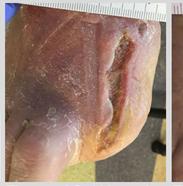

Figure 4C. Wound after 21 days of dNPWT

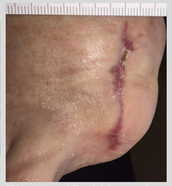

Figure 4D. Wound fully healed 49 days after presentation

- **DFU.** Wagner Stage 2 DFU. A hydrocolloid ring was applied during dNPWT application to help maintain a negative pressure seal. Wound care included sharp debridement, dNPWT (28 days) and ORC/C/Silver-ORC dressings (21 days). The wound was fully healed 49 days after presentation.

Figure 5A. Wound at presentation

Figure 5B. Wound after sharp debridement

Figure 5C. Application of dNPWT

Figure 5D. Wound after 7 days of dNPWT

Figure 5E. Wound after 28 days of dNPWT

Conclusions

- In this retrospective study, 14/16 patients displayed improvement in wound area, volume, and/or granulation tissue amount during dNPWT treatment.
- Most wounds (87%) were healed at, or shortly after, discontinuation of dNPWT.

Presented at Symposium on Advanced Wound Care Spring/ Wound Healing Society Meeting, April 6-10, 2022, Phoenix, AZ

NOTE: Specific indications, contraindications, warnings, precautions and safety information exist for these products and therapies. Please consult a clinician and product instructions for use prior to application. Rx only.

[1]University of South Carolina School of Medicine – Greenville, [2]PRISMA Health Upstate Greenville, SC; [3]Furman University, Greenville, SC; [4]3M, St. Paul, MN; [5]3M Deutschland GmbH, Neuss, Germany

*3M™ Snap™ Therapy System , †3M™ Promogran Prisma™ Matrix (3M, St. Paul, MN)

(3M, St. Paul, MN)

The authors thank 3M for assistance with poster preparation and production.

Dr. Klein is a consultant to 3M.