Use of the Talley VENTURI™ Negative Pressure Wound Therapy system for treatment of a chronic heel pressure ulcer

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Introduction

Negative Pressure Wound Therapy (NPWT) is the application of sub-atmospheric pressure in a closed drainage environment to a wound[1]. NPWT is delivered to the wound by a controlled electrical device or suction pump. The physiological benefits of NPWT include: removal of wound exudate; promotion of growth factors; maintenance of a moist wound environment; and management of tissue remodeling and contraction[2].

NPWT was developed in the 1950's by Russian surgeons hypothesizing that prophylactic removal of wound exudates post-operatively would decrease the risk of infection and increase healing rates[3]. The NPWT devices utilised in Russia were based on saline saturated gauze as the dressing medium. Suction levels were maintained at lower rates, usually between -50 and -75 mmHg. Flexible surgical drains were placed in the gauze dressing to facilitate exudate removal and the dressing set was sealed in a closed system. In the United States, Dr. Mark Chariker and Katherine Jeter, RN, ET, conducted further medical research with the utilisation of gauze based dressings for delivery of NPWT[4]. Their studies have been often referred to as the standard by which gauze-based NPWT systems have based their dressing kits. Utilisation of the gauze approach to NPWT application remains true to the development of NPWT as a sub-speciality of advanced wound care interventions. The following case study demonstrates the gauze-based approach to NPWT, utilising the VENTURI™ NPWT system manufactured by Talley Medical.

Case Study

The study patient is an 81 year old female with a chronic pressure ulcer on the right heel. Medical history includes Alzheimer's dementia; renal insufficiency; peripheral vascular disease; and chronic oedema of the bilateral lower extremities. The patient had developed this heel pressure ulcer over 41 weeks prior to the initiation of NPWT. Pressure reduction interventions were in place and nutritional interventions implemented. The patient was compliant with the interventions to enhance ulcer healing; however, the ulcer was stagnant despite several different topical interventions. Large amounts of wound exudate have kept the wound chronically saturated; therefore, lack of progression through the expected phases of wound healing has occurred. The ulcer also displays erythema, indurated edges, and the peri-wound skin has significant oedema. The patient has been on several regimens of oral antibiotics over the course of the presence of the ulcer.

Previous Wound Treatment

The past treatments for this chronic heel ulcer include: hydrofibre packing with secondary occlusive dressing; application of medical grade honey and secondary dressing; and saline wet-to-dry dressings. The patient reported pain of an 8 (1-10 scale) during each type of dressing change. The patient had experienced little improvement with these treatments; the surgeon on consult discontinued the topical treatments. It was at this time the surgeon ordered the VENTURI™ system to treat this non-healing ulcer with NPWT. The patient was also placed on a concurrent oral antibiotic due to the clinical symptoms related to the chronic inflammation of the ulcer.

Aims and Objectives

The goal for implementation of NPWT was to achieve adequate granulation tissue to the wound bed and decrease the overall wound depth by 75%, in order to prepare the wound for transition to topical dressings. To achieve these goals, the VENTURI™ system was initiated.

Method

The VENTURI™ Negative Pressure Wound Therapy system used utilises saline-moistened antimicrobial gauze, and a silicone channel drain, which is placed into the wound and sealed with a transparent occlusive dressing. NPWT was ordered continuous at -80mmHg daily with dressing changes every 48 hours for the duration of therapy. Specific treatment procedure occurred as follows:

- Wound was cleansed with normal saline and the peri-wound skin was patted dry
- Skin prep. was applied to the peri-wound tissue to facilitate adherence of the occlusive dressing
- A non-adherent, mesh contact layer was fitted to the wound bed size and placed directly in the wound bed
- A flat 10mm suction drain was trimmed to 0.5cm less than the depth of the wound to allow for progressive healing from the inside of the wound

- Saline-moistened AMD gauze was placed over the contact layer in the wound bed in a fashion that mimics wound bed size
- The trimmed flat drain was then placed on top of the moistened gauze in the wound bed, a second layer of moistened gauze was placed on top of the drain to fill the dead space of the wound
- A gel sheet was placed in proximity to the area where the drain would exit the wound for protection of the underlying skin and as a reinforcement to sealing the drain exit site
- The occlusive dressing was applied to the dressing, using a methodical side to side application, ending on the drain exit site side
- The drain tubing was secured distally with transparent medical tape to the patient's lateral calf area to prevent dislodgement during repositioning and transfers
- The VENTURI™ was set to -80mmHg on continuous therapy and remained at that setting, with dressing changes every 48 hours for the first week of therapy, decreased to every 72 hours for the remaining length of therapy

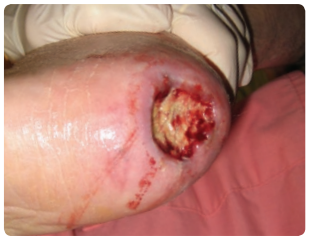
Results

The VENTURI™ system was placed on the patient residing in a long-term nursing facility.

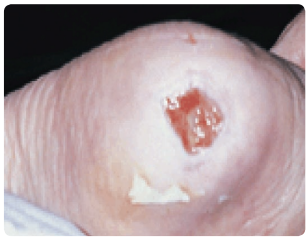
Day 1: At the initiation of therapy, the ulcer displayed symptoms of erythema, copious amounts of exudate and indurated wound edges; slough tissue was loosely adherent with odour. Wound measurements were as follows:- 5.6cm length x 5.3cm width x 2.0cm depth.

Day 47: The wound showed significant decrease in total surface, now measuring 2.7cm length x 3.1cm width x 1.1cm depth.

Day 63: After 9 weeks of therapy the wound measured 1.1cm length x 0.9cm width x 0.25cm depth. NPWT was discontinued with the goals of therapy being achieved, 100% granulation tissue in the wound bed and >90% decrease in wound depth. The ulcer had a 99% decrease in surface area and no longer displayed symptoms of chronic inflammatory phase, and had no odour. The patient reported no pain at the discontinuation of therapy. The patient was then transitioned to a topical moist dressing, changed every 3-5 days, until complete wound remodeling was achieved.



Day 1



Day 63

Discussion

NPWT is an accepted and effective intervention for prompting healing of chronic wounds. As demonstrated in this case study, the patient was unsuccessful to progress toward healing with traditional topical dressings. In an abbreviated time frame, the patient was able to experience wound regranulation and transition to topical moist dressings to complete the closure process with the use of the VENTURI™ system, a result that serves the patient for quality wound care and the health care system as a cost-effective outcome which will prevent further complications with the ulcer being resolved.

Conclusion

In conclusion, research supports that NPWT is an accepted intervention for appropriate wounds. It has been surmised that the use of NPWT can decrease infection rates up to 38%; decrease wound healing times up to 84%; and reduce costs of wound healing up to 68% (Journal of American Medicine, 2008).

References

1 & 2. Campbell, PE, Smith, GS, Smith JM. Retrospective Clinical Evaluation of Gauze-Based Negative Pressure Wound Therapy. *International Wound Journal,* 2008.

3 & 4. Chariker, M.E., Jeter, K.F., Tintle, T.E., Bottsford, J.E. (1989) Effective management of incisional and cutaneous fistulae with closed suction drainage. *Contemporary Surgery* Vol. 34, 59-63.

5. *Journal of American Medicine*, via internet, last accessed December, 17, 2008.

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