A Case Presentation: The Successful Management of Complicated Wounds in the Presence of an Infected Knee Prosthesis With Silver Antimicrobial Negative Pressure Dressing and a Negative Pressure Wound Therapy Device

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Abstract: A case study is presented of the successful management of complicated wounds in the presence of an infected knee prosthetic utilizing a silver antimicrobial negative pressure dressing in combination with a negative pressure wound therapy device.

Key words: knee wound, silver, vacuum-assisted closure, negative pressure wound therapy, osteomyelitis

A negative pressure wound therapy (NPWT) vacuum-assisted closure therapy system (V.A.C., KCI, San Antonio, TX) is indicated for the management of acute and chronic wounds in multiple settings. The NPWT system is intended to create an environment that promotes wound healing by preparing the wound bed for closure, reducing edema, promoting granulation tissue formation and perfusion, and by removing exudate and infectious material. It is indicated for the management of patients with chronic, acute, traumatic, subacute and dehisced wounds, partial-thickness burns, diabetic ulcers, pressure ulcers, flaps, and grafts.

The system is comprised of 3 components that work together to help promote wound healing through granulation tissue formation. It provides intermittent or continuous therapy, and promotes wound healing under negative pressure created at the wound in conjunction with dressings designed to work with the system (V.A.C. GranuFoam dressings, KCI, San Antonio, TX). The NPWT system applies mechanical forces, known as macrostrain and microstrain, to create an environment that promotes wound healing. Macrostrain force is the visible stretch that occurs when negative pressure contracts the foam and draws the wound edges together, provides direct and complete wound bed contact, evenly distributes negative pressure, and removes exudate and infectious materials. Microstrain force is also the mi-
in this case, which is designed to make contact with the wound as a primary dressing while permitting the passage of fluids (Figure 1). This NPD is indicated for the local management of first and second degree burns, partial to full-thickness wounds, donor and graft sites, acute wounds, lacerations, abrasions, traumatic wounds, surgical wounds, dehisced wounds, stage I-IV dermal ulcers, pressure ulcers, diabetic ulcers, and venous ulcers. The presence of silver in this dressing provides an effective protection against microbial contamination, which aids in preventing bacteria from invading deeper tissue planes. This silver dressing provides broad-spectrum coverage, allowing 5-7 day dressing changes with NPWT.3

**Case Presentation**

A female patient, 91 years old and without diabetes, presented with 2 knee wounds that had periodically opened for 3 years. The most recent episode had lasted for 97 days, which is when the patient presented to the authors’ clinic (Lakeland Regional Medical Center, Center for Wound Care and Hyperbaric Medicine, Lakeland, FL) (Figure 2). These wounds were superficial to a painful, chronically infected knee prosthesis. The patient previously had multiple soft tissue incisions and drainages, as well as multiple soft tissue debridements, and was not a good candidate for revision knee surgery. It was determined that the primary active infection was confined to the soft tissue, although a chronic infected prosthesis was present.

Deep soft tissue biopsy culture revealed yeast and *Enterococcus faecium*. The most recent osteomyelitis management to date was daily administration of oral doxycycline 50 mg, oral rifampin 600 mg, and oral fluconazole 150 mg. The total time of the aforementioned antibiotic and antifungal treatment was 8 weeks.

Wound management was initiated with ulcer debridement followed by NPWT, and the silver-containing antimicrobial NPD. The NPD was placed in apposition to the wounds covered by NPWT. The addition of the antimicrobial NPD decreased dressing changes from 3 times a week to approximately once a week, or every 5 days. The decrease in dressing changes significantly reduced the patient’s pain, and also reduced the overall cost of the wound care. This patient progressed very well. Although the use of the silver-containing antimicrobial NPD with NPWT does not directly treat bacteria in bone or at the prosthesis, it can aid in closure of these types of difficult wounds in the presence of an infected prosthesis and infected bone. This is due to the mechanism of this particu-
lar NPD, which decreases the bacterial load of the wound to within the threshold tolerated by the body to allow healing with NPWT, and to prevent further bacteria to contaminate, and then infect, these types of wounds.

The 2 ulcers healed at 70 days after initiation of debridement and initiation of NPWT using the silver-containing antimicrobial NPD. This combination management was used throughout the wound treatment. There was no recurrence of the osteomyelitis or wounds 18 months after healing (Figure 3). The patient is functioning well and is weight-bearing without restrictions.

Discussion

The protocol for NPWT at the authors' hospital is application and change every 2 days. When the silver antimicrobial negative pressure dressing was used with the wound, this patient's NPWT was changed every 5 days. Dressing changes in a 2-week period were reduced from 7 dressing changes when NPWT was used alone, to 2.5 dressing changes. Because of these decreased visits, in a 2-week period the patient required 12 home health care visits. In the same time period, utilizing the NPWT alone, there would have been an estimated 35 nurse visits. This was a 66% reduction in home health care visits by incorporation of the silver antimicrobial NPD. This reduction in dressing changes significantly reduced the supplies required throughout the wound management by approximately 66%. This reduction in time and cost expenditures are considered to be conservative because the authors' opinion is that NPWT alone would have healed this patient, but the time to heal would have been beyond 70 days. The management of these wounds beyond 70 days would obviously require more nursing time and supplies.

Conclusion

This case presentation demonstrates the successful management of complicated leg wounds in the presence of an infected knee prosthetic with a silver antimicrobial NPD in partnership with NPWT. The silver antimicrobial NPD with NPWT was easy to apply and well tolerated by the patient. This combination wound management therapy significantly decreased the total nursing time required for home health care visits and total treatment costs to heal these difficult wounds.

References