The use of V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressings in the Management of Burn Wounds

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Negative pressure wound therapy (NPWT) dressings have been a staple in acute and chronic wound management for the last several decades. NPWT dressings have made wound care more manageable and tolerable for patients by decreasing the frequency of dressing changes-often 2-3 times weekly depending on the wound type, size, and exudate, as opposed to once or twice a day. NPWT dressings have also been shown to accelerate healing by creating an environment that promotes wound healing through biomechanical and cellular forces on the wound bed and surrounding tissues.[1] Recently, NPWT has evolved to include the addition of instillation of a topical wound solution (V.A.C. VERAFLO™ Therapy). This instillation assists with more frequent wound bed lavage and biomechanical stretch, and compression of the wound bed has been shown to accelerate debris removal and improved granulation tissue formation.[2] The V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was developed for use with V.A.C. VERAFLO™ Therapy specifically for wounds with thick exudate and to facilitate wound cleansing.

In the burn care arena, NPWT dressing utilization is likewise well documented. Of all of the potential applications of negative pressure utilization in burn patients, usage as a split-thickness skin graft (STSG) bolster is the most common and the use that boasts the most peer-reviewed data.[3;4] Still, usage as a primary dressing modality for acute burns has been researched and published.[5;6] Being a relatively new technological advancement to the wound care treatment armamentarium, less research is available discussing the use of V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing in this area. A recent article and case review from the burn group at the Arizona Burn Center concluded that usage of V.A.C. VERAFLO CLEANSE CHOICE™ Dressing, especially with a hypochlorous acid instillation solution, resulted in a shorter time to wound closure with skin grafting in a burn or necrotizing soft tissue infection population.[7] Experience utilizing this technology in burn care is growing. We discuss two recent cases that underwent burn/thermal injury wound care to assist in the management of ultimate closure of their wounds.

Case 1

A 55-year-old male was found in his home, unresponsive and hypothermic during an especially frigid spell in January. The patient was intubated prior to arrival with suspected pressure wounds. After active rewarming and resuscitation, the patient's wounds were better addressed, and consisted of wounds to both forefeet and heels consistent with stage 4 frostbite as well as wounds to his right hand and arm consistent with full-thickness contact burns from being found unresponsive on his space heater **(Figures 1-2)**. It is important to note that V.A.C. VERAFLO™ Therapy is not indicated for use on full-thickness burns.

Figure 1. Bilateral foot frostbite injuries shortly after admission demonstrating "fourth degree" damage to the heels; photo courtesy of Jeffrey Litt, DO

Figure 2. Right arm and hand shortly after admission showing full-thickness burns to the forearm as well as hand; photo courtesy of Jeffrey Litt, DO

Ultimately, once the patient stabilized, the burn team brought him to the operating room for initial excision of his arm and hand burns. The patient was observed to have poorly controlled, Type 1 diabetes with a history of coronary artery disease. At this initial operation, his right hand was noted to be severely burned with exposed and damaged tendon and bones on his 4 fingers **(Figure 3)**.

Figure 3. Intra-operative picture of the right hand post initial tangential excision with exposed extensor tendons and irreparable finger damage; photo courtesy of Jeffery Litt, DO

The patient had full-thickness burns to his forearm and arm, as well. Ultimately, he underwent amputation of his lateral 3 fingers and autografting of his arm wounds. His remaining hand was managed with a groin flap, and he ultimately retained his thumb and forefinger **(Figure 4)**.

Figure 4. Right hand post-reconstructive surgery, including 3-5 finger amputations and pedicled groin flap coverage, demonstrating functionality of remaining hand; photo courtesy of Jeffrey Litt, DO

The patient's feet were managed conservatively to allow for wound demarcation, consistent with standard frostbite management. He continued to improve clinically and ultimately was extubated without signs of anoxic brain injury. Approximately 6 months after his initial injury his foot wounds demarcated to the point of requiring more definitive closure **(Figures 5-6)**. In an attempt to preserve his feet and legs and avoid bilateral below-knee amputations, transmetatarsal amputations were performed, with staged closure using a dermal template and eventual split-thickness skin graft application. The patient also received bilateral full-thickness skin grafts to his heels at this time. Post-amputation, V.A.C. VERAFLO™ Therapy using a V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was utilized to accelerate wound bed preparation. Normal saline (30 mL right, 20 mL left) was instilled into the wound bed with a dwell time of 3 minutes, followed by 2 hours of negative pressure at -125 mmHg. Dressing changes occurred every 2-3 days.

Figure 5. Demarcated bilateral feet with dry, gangrenous toes ready for trans-metatarsal amputations; photo courtesy of Jeffrey Litt, DO

Figure 6. Full-thickness frostbite wounds of the heel prior to full-thickness skin grafting, approximately 6 months post-injury; photo courtesy of Jeffrey Litt, DO

Excellent wound bed preparation was achieved with full wound bed coverage with healthy granulation tissue following V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing use after 7 days **(Figure 7)**. Ultimately the patient was approved for skin grafting after staging with neo-dermis (Kerecis® Omega3 Wound Acellular Dermal Matrix, Kerecis LTD, Arlington, VA) to help with deeper tissue coverage. Approximately two weeks later, the patient's bilateral foot wounds were optimized, and he received STSG with NPWT bolstering, which resulted in excellent (100%) graft take. The patient is currently ambulatory at home, able to wear offloading boots, and is being fitted for forefoot orthotics to assist with his balance over his well-healed and stable skin grafts **(Figure 8)**.

Figure 7. One-week after transmetatarsal amputations and V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing use. Exposed deeper structures, primarily on the right foot staged with a fish-derived dermal template; photo courtesy of Jeffrey Litt, DO

Figure 8. Durable thick split-thickness skin grafts approximately 1 month post-grafting; photo courtesy of Jeffrey Litt, DO

Case 2

A 60-year-old male with numerous comorbidities including severe aortic stenosis as well as uncontrolled diabetes and resultant neuropathies resulting in a prior above-the-knee amputation of his right leg presented for care. The patient sustained a chemical burn with bleach on his left foot the day prior to admission to our facility and was transferred to our center from an outside facility after decontamination occurred with a presumptive diagnosis of sepsis from this extensive left foot wound. In the emergency room, non-excisional debridement of his foot occurred, and local wound care was performed after admission to the hospital with appropriate antibiotics as he stabilized. The patient's entire foot was involved, with full-thickness wounds noted throughout **(Figures 9)**.

Figure 9. Left foot shortly after admission, approximately 24 hours post bleach chemical burn. A. Plantar surface of foot; B. Dorsal foot demonstrating deep, full-thickness appearing burns; photo courtesy of Jeffrey Litt, DO

The patient was felt to be a poor surgical candidate for standard operative excisional debridement, and he refused to discuss the possibility of a second leg amputation under regional anesthesia. Given the need for further wound cleansing and debris removal, we utilized V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing on hospital day 2 with 50 mL of normal saline for instillation, a dwell time of 5 minutes, followed by 2 hours of negative pressure at -125 mmHg. Dressings were changed every 2-3 days. At dressing removal, approximately 50% of the eschar had separated and the wounds were improving **(Figure 10)**. The V.A.C. VERAFLO™ Therapy was discontinued on hospital day 6 to allow for discharge to home with a silver-impregnated foam.

Figure 10. Wounds after 3 days of V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing. A. significant improvement in plantar wound bed; B. Improvement on dorsal surface; photos courtesy of Jeffrey Litt, DO

The patient was seen in clinic approximately 2 weeks later, with continued healing and silver dressings applied. We continued bi-weekly outpatient visits for approximately the next 6 weeks, and his foot was nearly 100% healed and epithelialized 3 months following his initial injury **(Figure 11)**.

Figure 11. Healed left foot chemical burn 3 months after injury; photo courtesy of Jeffrey Litt, DO

While NPWT dressings are commonly used in wound care and burn care, the use of V.A.C. VERAFLO ™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing being used for acute burns and traumatic or infected wound management is slowly increasing in usage. One of the reasons why it is being slowly adopted is that many practitioners are unfamiliar with the technology, the appropriate instillation solution, and the settings required to maximize patient outcomes. In our academic medical center, both in burns as well as other wound etiologies, the experience of using the V.A.C. VERAFLO ™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was likewise slowly adopted until our comfort level improved; not only with application of the dressings and technology, but likewise with understanding of the clinical rationale behind using certain settings and/or topical wound solution use in specific scenarios-with much of this information being gained through the direct experience of using the V.A.C. VERAFLO™ Therapy. While reviews of the evidence and clinical practice guidelines have been published and are very useful,[8-10] we have found that the practical experience of "just doing it", (i.e. using the V.A.C. VERAFLO™ Therapy in different clinical scenarios to understand its place in the wound healing algorithm) ultimately informed our usage even more than the peer-reviewed literature. Recently, an update to the international consensus guidelines was published detailing appropriate wound types, topical wound solution types, and appropriate starting settings, such as amount of negative pressure and the optimal dwell/suction time(s).[10] Inexperienced practitioners looking to begin initiating the V.A.C. VERAFLO™ Therapy for burns, or other various wounds, should look to these and other practice guidelines for starting points. The experience of using the technology allows for the customization based on wound and patient specifics; but the "starting settings" are most frequently sufficient for most wounds on most patients to help promote wound healing.

The use of V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing in burn care has great potential to act as the primary wound dressing for burns that need staging and may help prevent burn wound progression in mixed-depth or deeper burns. In my experience, V.A.C. VERAFLO™ Therapy also has a role in the reconstruction of burn or thermal injury wounds by helping optimize the wound bed. In our experience, its usage, especially in the medically frail, complex patient, or burn wound can be helpful in wound cleansing.

Patient data and photos courtesy of Jeffrey Litt, DO.

As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition.

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.

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