The NPWT PRO Advantage

#SimultaneousIrrigation #Effective #Simple: A Plastic Surgeon's Perspective

This is a brief summary of a presentation at the annual fall conference of Wounds Canada, in London, Ontario, on November 8, 2018. It has been produced with the financial support of Cardinal Health. The presenter was Dr. Kenneth J. Moquin, plastic and general surgeon, senior staff surgeon at Henry Ford Health System, and clinical assistant professor at Wayne State University School of Medicine (Detroit, MI).

Negative Pressure Wound Therapy (NPWT)

Negative pressure is the controlled application of sub-atmospheric pressure to the local wound environment using a sealed dressing connected to a pump. Negative pressure wound therapy stimulates cellular proliferation and inflammation, affects local perfusion (angiogenesis and edema reduction), stimulates development of granulated tissue, protects the wound from the external environment, assists in wound contraction and may reduce bioburden. While this technology has existed for many decades, the addition of simultaneous irrigation into NPWT is a relatively new advancement in the treatment.

Combining NPWT + Simultaneous Irrigation

Challenges associated with NPWT include the following:

- Wounds are difficult to cleanse at the time of dressing change.
- Foam can have a slimy appearance when removed from the wound.
- Wounds often have scattered slough at the start of therapy.
- Removing foam from the wound may be painful.
- Progress slows over time.

Adding simultaneous irrigation to an NPWT dressing means a wound is cleansed of slough and debris, bioburden is reduced, foam is cleansed, moisture is balanced in the wound bed, and the patient experiences less pain at dressing changes and during treatment.

Cardinal's NPWT PRO is affordable and easy to use for clinicians, patients and their families, making it an efficient NPWT treatment. Negative pressure can help clinicians achieve healing goals, but sometimes suction isn't as good as it could be, leaving a film over the wound and slowing the healing process. To augment this treatment, Cardinal Health offers a new advancement that allows clinicians to irrigate the wound at the same time negative pressure therapy is applied to the wound. This allows for uniform hydration of the wound and the use of advanced wound care products, which are often applied under the dressing. Clinicians using simultaneous irrigation never compromise the negative pressure treatment to the wound. In addition, a constant river of clean saline or another agent can be delivered to the wound. Ideal rates of irrigation are still being investigated, but the current recommendation is somewhere between 10 and 40 cc/hour.

Possible Irrigation Solutions

- **Hypochlorite-based solutions**
- **Silver nitrate (0.5%)**
- **Sulphur-based solutions**
- **Biguanides**
- **Cationic solutions**
- **Isotonic saline**
- **Antibiotic solutions**
- **Acetic acid (0.25%)**

Case Study

A 30-year-old police officer in Detroit was chasing an assailant when he cut his leg on a fence. He arrived in the clinic with necrotizing fasciitis. After debridement and source control, it was noted that large amounts of soft tissue were missing, there were large areas of exposed surfaces, and pain levels were extreme. First, the wound was cleaned with debridement, cleansing and dressing changes. After the wound was controlled, it was treated with negative pressure and irrigated with acetic acid. This incited granular tissue formation, and there was no clinical evidence of a prohibited bioburden formation. Through dressing changes, a uniform granulation bed was seen and was amenable to skin grafts. Following the skin grafts, the wound was covered with white foam and a layer of black foam on top, and continuous irrigation was applied to the fresh skin graft.

About one month later, the skin graft was well matured, and healthy granulation tissue was present—an excellent skin graft response with no maceration. Skin around the graft area remained pliable, and the patient did not have flexion issues.

These kinds of result are highly reproduceable: they are seen every day when using NPWT in combination with simultaneous irrigation.

Challenges with using continuous irrigation with NPWT include educating colleagues about its uses and, when a decision has been made to use it, deciding on the most suitable irrigation solution. To determine this, clinicians should consider what their goals are: To decrease bioburden? To increase hydration? Something else?

The Evidence Behind the Treatment

A research project was conducted to demonstrate the fluid dynamics of continuous irrigation. Using a three-dimensional wound model made of clear ballistics gel, the study found that irrigation fluid doesn't simply take the path of least resistance back to the source of the suction (the vacuum). Instead, the study suggested the entire surface of the wound is exposed to the irrigation fluid before the fluid exits (stochastic displacement).[1] This is why simultaneous, continuous irrigation is effective. The most common solution used is normal saline, followed by variants of acetic acid (maximum 3% concentration).

Applying continuous irrigation is an easy process that can be done by community-care workers, caregivers, family members and, at times, patients themselves. While it has been suggested through animal models that negative pressure with continuous irrigation does not improve the rate of wound healing more than NPWT does on its own, it does decrease the bioburden of wounds when compared to standard NPWT treatment.[2] In my practice, I use NPWT with simultaneous irrigation because, despite a lack of clinical evidence at this time, my patients report dramatically less pain during this therapy than with other forms of treatment, including NPWT on its own.

References

1. Davis KE, Moquin KJ, Lavery LA. The fluid dynamics of simultaneous irrigation with negative pressure wound therapy. Int Wound J. 2016;13(4)469–74.
2. Davis K, Bills J, Barker J, Kim P, Lavery L. Simultaneous irrigation and negative pressure wound therapy enhances wound healing and reduces wound bioburden in a porcine model. Wound Repair Regen. 2013;21(6):869–75.

Presentation Digest is a production of Wounds Canada. (www.woundscanada.ca).