Small incisions were made in the affected area with minimal debridement. Any necrotic subcutaneous tissue can be surgically suctioned out. Black foam (KCI) was sized and placed in the wound. A separate inflow tube (IV extension with port) was placed on and through the black foam. The adhesive drape was attached and placed over the entire area including the black foam. The area around the tubing was intubated for 16 days in a coma before complete recovery.

Figure 1. A line diagram of the equipment for NPWT with adjunctive NeutroPhase® irrigation.

Figure 2. A: 51-year-old patient with NF in the arm. B: NeutroPhase® was instilled along with limited incision and only open drainage into a sponge. C: The wound quickly changed to regenerative stage and D: healed.

Figure 3. A: 41-year-old patient with NF of the lower abdomen and right upper thigh. Multiple small incisions were used without removing infected fascia, just suctioning out necrotic subcutaneous tissue. B: Instill VAC irrigation was conducted through multiple ports. C: The result was far less scarring with less pain and more rapid healing.

Figure 4. A: 45-year-old patient with abrupt onset of Fourrier’s gangrene. B: Immediate incision and drainage was performed removing the necrotic skin of the scrotum and penile base followed by instill vac with NeutroPhase®. C: Within 2 weeks the thigh stored testicles and cord were surgically freed and eventually healed within one month with a split-thickness skin graft.

Results

There are 4 phases of normal wound healing: (1) coagulation, (2) inflammation, (3) tissue formation, and then (IV) tissue re-modeling. Necrotizing fasciitis (NF) occurs when the wound healing has halted in phase II due to bacterial toxins causing severe infection. NF is a disease that can be devastating when untreated. Type I NF is classified as a polymicrobial infection, whereas Type II NF is classified as a monomicrobial infection. NF is caused by many types of bacteria, including but not limited to Group A Streptococcus [Streptococcus pyogenes], Group B Streptococcus [Streptococcus agalactiae], Staphylococcus aureus, Vibrio vulnificus, Clostridium perfringens, and Bacteroides fragilis. Immunocompromised people are more likely to develop these infections. With aggressive treatment of antibiotics and surgery, there’s still a high chance of mortality and limb amputation.

Discussion

The aggressive NF treatment starts with antibiotic therapy and then results in a full debridement of all necrotic tissue. However, removing the bacteria and the tissues does not remove any of the toxins and debris that halt the healing process. Laboratory studies have shown that hypochlorous acid in solution not only has anti-microbial activity, disrupts biofilms, penetrates microbial cell walls and amoeba cysts, but it has been shown that pure hypochlorous acid also rapidly inactivates S. aureus and S. pyogenes toxins. Because of this in vitro evidence, we interpret that introducing hypochlorous acid cleanses the wound of toxins allowing the next phase of wound healing to proceed. These cases suggest that it is unnecessary to be too aggressive especially with the debridement. Small incisions and minimal debridement with the help of surgical suction will allow for quicker recovery and less pain. Over the last 4 years, at least 7 other patients were found with the diagnosis of NF in medical records at Seton Medical Center. They were treated with the standard therapy and 2 died, 1 had amputation and 3 survived. This fits with the expected outcome from the literature. In comparison, 7 NF patients treated with our new therapeutic algorithm resulted in no deaths and no limb amputations. Two of these patients had toxic shock and both recovered, although one was intubated for 16 days in a coma before complete recovery.

Conclusions

- Release of bacterial superantigens and of cellular toxins from damaged cells increases the toxicity. This puts the patient into a critical state which requires incision and drainage.
- Based on these clinical cases, our data indicate that pure 0.01% hypochlorous acid, used with NPWT, should be considered the new treatment regimen for treating NF.
- NeutroPhase®, a solution of pure 0.01% hypochlorous acid (a peroxidase) in normal saline, is a tissue adhesive and wound cleanser by NovaBay Pharmaceuticals, Inc., 5980 Horton Street, Suite 550, Emeryville, CA 94608.

References