Is Pulsed Lavage for Wound Healing Still Relevant to Clinical Practice?

Kimberly Hall, DNP, RN, GCNS-BC, CWCN-AP

Kimberly D. Hall is a doctoral prepared Clinical Nurse Specialist. She has specialized in wound care for more than 14 years and she currently resides in Eugene, Oregon.

NOTE: 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.

Wound irrigation and cleansing is an important step in the wound healing process. Thorough cleanings help free the wound bed from debris and non-viable tissue and promote wound hydration. Challenges to wound irrigation include being able to clean the wound while being careful not to cause trauma to the wound bed or forcing surface bacteria into the deeper structures of the wound.

For several decades, pulsed lavage has been used as a method of wound cleansing used to irrigate contaminated wounds. Pulsed lavage uses direct, high pressurized jets of a topical wound cleansing solution to direct a stream at and around wounds to remove and soften debris and necrotic tissue. The held device helps control the stream of liquid and it is attached to a concurrent negative pressure suction pump that assists in the removal of the solution and wound debris. Topical wound solutions that are used with the goal of reducing the bacterial burden of the wound and include topical surfactant-based cleansers, antibiotics, antifungals, antiseptics and anesthetics.

Historically speaking, pulsed lavage has been used to assist with wound cleansing and debridement and removal of devitalized tissue. However, there is limited evidence to support wound healing as a result of pulsed lavage therapy, rather there is controversy surrounding the clinical effectiveness of the treatment in general. In chronic wounds, high pressure systems have been shown to cause significate damage to new granulation tissue and epithelium that is the crux of wound healing. With high-pressure lavage, a there is the possibility of damaging bone and tendon structure and pushing surface bacteria into the mucosal epithelium and deeper wound compartments and intramedullary bacterial seeding, which can increase the risk of wound infection.[1]

Harringer, Harding and Wongworawat studied the role of high pressure pulsatile lavage in circulating bacteria into soft tissue structures. They compared the depth of penetration and amount of retention of bacteria in contaminated soft tissue that was subjected to one of two lavage methods. They used harvested identical ovine muscle and stained the structures with equal staphylococcus aureus bacteria. Results of their study concluded that the muscle tissue subjected to high pressure lavage had an increased depth of bacterial penetration compared to the low pressure lavage. In addition, the tissue subjected to high pressure lavage was also found to have a higher count of retained bacterial contamination.[2]

In addition to the increased risk of wound infection controversy when using high pressure pulsed lavage, Boyd, Harding, and Wongworawat also studied the effects of the therapy on soft tissue damage. Their study was designed to quantify and compare the damage to soft tissue caused by both high pressure and low pressure lavage. They compared forty ovine muscle tissue samples subjected to high and low pressure lavage treatments with ten additional specimens used as controls. The results of the study showed that high pressure pulsatile lavage caused more than three times the rate of soft tissue penetration of particulate markers over the low pressure. In addition, all of the tissue structures subjected to high pressure lavage showed gross tissue disruption which depth was measured. Cellular death was measured at approximately twice the depth with high pressure lavage in comparison to low pressure lavage.

The increased risk of wound infection is an obvious detriment to the patient, but further evidence suggests that risk of bacterial cross-contamination to other patients and caregivers can occur with pulsed lavage. There have been recent incidence reports and studies that have shown serious incidents of bacterial contamination with pulsed lavage. An outbreak of multidrug-resistant A. baumannii occurred in a facility where cultures linked the bacterial strain to patients undergoing pulsed lavage therapy within the same facility due to environmental contamination. This cross-contamination reported eight of the outbreak case patients had wound infections and three had both bloodstream infections and pneumonia. Three patients required admission to the intensive care unit for sepsis and respiratory distress, and 2 patient deaths were possibly related to their infections.[4] Environmental concerns identified in this study included pieces of the pulsatile lavage equipment that were contaminated either by a break in disposal process or product design. In incidents of cross-contamination in this situation, bacterial aersolization occurs due to the amount of splash associated with high pressure wound cleansing.

High risk for infection, damage to soft tissue structures, and risk of bacterial cross-contamination are serious cause for concern for patient safety. Recent evidence has shown many incidences of unfavorable results for patients receiving pulsed lavage therapy. This should beg the question, "is pulsed lavage still a relevant treatment for wound healing"? In medicine, we are often tasked to determine if the risk of treatment outweigh the potential benefit, which produces a difficult conundrum for the case of pulsed lavage.

References:

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