IRRIGATION WITH POTABLE WATER VERSUS NORMAL SALINE IN A CONTAMINATED MUSCULOSKELETAL WOUND MODEL

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**BACKGROUND:**
While the use of potable water for irrigation of complex musculoskeletal wounds is attractive in an austere environment, its effectiveness has not been tested. We sought to compare the abilities of potable water irrigation and normal saline irrigation to reduce bacterial number.

**METHODS:**
The Institutional Animal Care and Use Committee approved all experiments and animal care procedures. All procedures were conducted in an animal facility approved by the Association for Assessment and Accreditation of Laboratory Animal Care, and all were performed in accordance with the National Institutes of Health guidelines for care and use of laboratory animals.

We used an established goat model involving the creation of a reproducible complex musculoskeletal wound with injury to muscle, fascia, periosteum, and bone followed by inoculation with *Pseudomonas aeruginosa* (lux) bacteria. This genetically altered luminescent bacteria provides the ability for quantitative analysis with a photon-counting camera system. Six hours after injury/inoculation, wound irrigations were performed using pulsed lavage. Fourteen goats were randomized into two treatment groups: irrigation with 9 liters of potable water versus irrigation with 9 liters of normal saline. Images obtained immediately after irrigation were compared to baseline images to determine the reduction in bacterial luminescence resulting from treatment.

Aquacosmos imaging software (Hamamatsu Photonics Inc., Hamamatsu-City, Japan) provided a count of RLUs for the entire field of view of the camera. All values were expressed as mean ± SEM. All ratios were analyzed between potable water and saline irrigation groups (Figure 1). The mean RLU prior to irrigation in the potable water group was 1.32 x 10^6 (± 4.01 x 10^5). After irrigation, the mean RLU was reduced to 3.89 x 10^5 (± 1.31 x 10^5). The mean RLU prior to irrigation in the normal saline group was 1.52 x 10^6 (± 4.96 x10^5). After irrigation, the mean RLU was reduced to 4.45 x 10^5 (± 1.80 x 10^5). There were no statistically significant differences between the mean RLUs in the two groups both before (p=0.76) and after irrigation (p=0.80).

**RESULTS:**
Both irrigation treatments reduced the bacterial counts by 71% of the pre-treatment levels. The differences between the pre-treatment and post-treatment bacterial counts were statistically significant for both the potable water and normal saline groups (p=0.0093 and p=0.0039, respectively).

The quantitative reduction in bacteria was similar for both treatment groups (Figure 1). The mean RLU prior to irrigation in the potable water group was 1.32 x 10^6 (± 4.01 x 10^5). After irrigation, the mean RLU was reduced to 3.89 x 10^5 (± 1.31 x 10^5). The mean RLU prior to irrigation in the normal saline group was 1.52 x 10^6 (± 4.96 x10^5). After irrigation, the mean RLU was reduced to 4.45 x 10^5 (± 1.80 x 10^5). There were no statistically significant differences between the mean RLUs in the two groups both before (p=0.76) and after irrigation (p=0.80).

**CONCLUSION:**
The use of potable water for wound irrigation is a feasible option in an austere environment. While the use of a sterile, isotonic solution remains the gold standard and is recommended if the supplies exist, potable water irrigation removes an equal amount of bacteria from contaminated wounds and can be considered for use in situations with supply constraints.

**REFERENCES:**