Tissue Debridement and Bacterial Removal in a Porcine Model: A Comparative Study of Waterjet (Versajet) Hydrosurgery System and Pulse Lavage
(Non-U.S. research conducted within guidelines of my country)
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Purpose: Our objective was to evaluate the effectiveness of pulsed lavage and waterjet (Versajet) hydrosurgery to remove two Staphylococcus aureus strains from porcine tissue and graphite powder from simulated fractures.

Methods: Overnight broth cultures (NCTC 6571) and clinical S. aureus strains were diluted to yield inocula containing $1 \times 10^6$ cfu/mL. Initially, 8 porcine legs were used; porcine tissues were inoculated with 10 mL of either of the 2 S. aureus strains. Control tissues were inoculated with phosphate buffered saline. All inoculated samples were irrigated with 300 mL of saline using the pulsed lavage system or using the Versajet (power was set at level 1). To assess bacterial clearance, all wash samples were collected separately, together with a sample of each inoculum. Ten mL each of the following were plated out in triplicate: (1) inoculum preincubation, (2) inoculum postincubation, (3) each leftover inoculum following removal of tissue and dilutions of $10^1$ and $10^2$, and (4) wash from all samples. Eight additional porcine legs were used where 2 incisions were made down to bone in a cross-hatch pattern. One gram of graphite powder was infiltrated into each fracture site to simulate a contaminated open fracture. Each fracture site was irrigated with 500 mL saline through pulsed lavage or Versajet (power was set at level 1).

Results: The average microbiological reduction using pulsed lavage or Versajet was 2% and 15%, respectively. The clinical S. aureus strain was more adherent than the laboratory strain. The Versajet maintained a 12% to 16% reduction of S. aureus, whereas pulsed lavage did not reduce contamination. The number of graphite particles was significantly reduced with the use of the Versajet system compared with the pulsed lavage.

Conclusions: The Versajet hydrosurgery system was more effective in removal of foreign particles and more effectively reduced the microbiological load of both examined S. aureus strains in a porcine model. Further studies are indicated to evaluate the efficacy of this hydrosurgery system in clinical practice with living tissue.

Disclosure: (n-Respondent answered 'No' to all items indicating no conflicts; 1=Board member/owner/officer/committee appointments; 2=Medical/Orthopaedic Publications; 3=Royalties; 4=Speakers bureau/paid presentations; 5A=Paid consultant or employee; 5B=Unpaid consultant; 6=Research or institutional support from a publisher; 7=Research or institutional support from a company or supplier; 8=Stock or Stock Options; 9=Other financial/material support from a publisher; 10=Other financial/material support from a company or supplier). For full information refer to page 46.