A Micro-CT and Biomechanical Analysis of the Effects of Intra-Wound Vancomycin Powder on Infection and Bone Healing in a Rat Model

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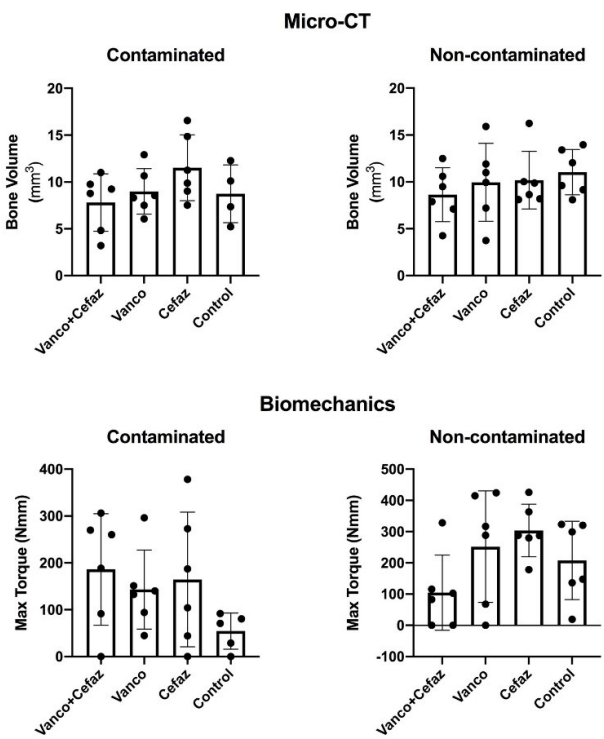
Purpose: The purpose of this study was to investigate the effects of intrawound vancomycin on the treatment of infection and fracture healing using micro-CT and biomechanics. We hypothesized that the application of vancomycin would be effective in preventing infection, without negatively affecting fracture healing.

Methods: Rats were assigned to 1 of 4 groups: (1) no antibiotics, (2) local vancomycin powder, (3) systemic cefazolin, or (4) local + systemic antibiotics. Animals either received an inoculum of Staphylococcus aureus or a control solution at the fracture site, creating 8 groups. The fracture was created by performing a midshaft osteotomy, followed by plate fixation. Local vancomycin powder was administered at the fracture site based on the treatment group. Animals allocated to systemic cefazolin received this every 8 hours for 4 doses. Study end point was 10 weeks, at which point tissue/implants were harvested for culture and bone healing was assessed with micro-CT and biomechanics.

Results: In the noncontaminated groups, no positive cultures occurred (0/24). The contaminated groups showed no positive cultures with local vancomycin (0/6) or local vancomycin + cefazolin (0/6). However, positive cultures were associated with one of the rats that received cefazolin only (1/6) and all animals that did not receive any antibiotics (6/6). Micro-CT and biomechanical results are shown in Figure 1. There were no statistically significant differences between groups with respect to bone formation or functional strength of the healed bone.



Conclusion: Our results suggest that the application of local intrawound vancomycin is effective for the prevention of infection and does not have a negative effect on fracture healing, thus supporting its use in contaminated or at-risk fractures.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.