Do Antibiotic Bead Pouches Prevent Surgical Site Infections and Complications in Patients with Severe Lower Extremity Open Fractures?

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Purpose: Antibiotic-laden beads provide high, local concentrations of antibiotics and are used to prevent infections in open fractures. This study aimed to determine if wound management with antibiotic beads was associated with fewer surgical site infections (SSIs) and unplanned fracture-related operations.

Methods: This cohort study included patients enrolled in the Aqueous-PREP or PREPARE trials with a single Gustilo-Anderson (GA) type III open fracture of the lower extremity. Our primary outcome was SSI within 90 days of initial surgery. The secondary outcomes included both SSI and unplanned reoperation for infection within 1 year of injury and adverse renal events. We used propensity score matching to reduce bias related to several factors including wound contamination and number of surgeries that may influence the use of antibiotic beads. We used conditional logistic regression to estimate odds ratios (ORs) for the association between antibiotic bead use and the study outcomes.

Results: Of 1039 included patients, 106 (10%) received antibiotic beads comprised primarily of vancomycin (95%) and tobramycin (77%). In the propensity score matched control group without beads, 36 patients (34%) were initially treated with wound vacuum therapy. After matching, antibiotic beads showed a trend towards higher odds of SSI within 90 days of surgery (27% vs 15%, OR 1.9, P = 0.055). Bead use was associated with an increased odds of SSI within the year following injury (38% vs 22%, OR 2.0, P = 0.02) and an increased odds of unplanned reoperation for SSI (32% vs 20%, OR 2.0, P = 0.03). Bead use was not associated with adverse renal events.

Conclusion: In this propensity matched analysis, patients with open lower extremity fractures treated with antibiotic beads had greater odds of SSI and unplanned reoperation for infection in the year following injury. These findings challenge the previously reported effectiveness of antibiotic-laden beads from retrospective studies. This contrasting result may be due to higher quality data in this prospective study or residual confounding due to using beads in riskier patients that may still persist even after propensity score matching. A randomized trial in this arena is warranted.