Δ Acute Application of Antibiotic Powder in Open Fracture Wounds (APOW): A Pilot Study

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Purpose: Antibiotic powder has been found to decrease the local infection burden with low systemic risk. Research evaluating the use of antibiotic powder in open fractures prior to taking the patient to the operating room (OR) is scarce. The purpose of this study was to perform a pilot study aimed at informing a future randomized controlled trial on the acute administration of antibiotic powder in open fracture wounds. Additionally, we aimed to test the feasibility of being able to build bacterial genomic libraries from samples collected from open fracture wounds at different time points of care.

Methods: All patients received standard of care for open fracture management. Enrolled patients were randomized into a vancomycin, tobramycin, or control arm and the appropriate antibiotic powder was administered directly into the wound in the emergency department (ED). Intrawound samples of the open fracture site were obtained in both the ED and the OR. Samples were analyzed at a local genomics laboratory to build genomic libraries of the bacteria present in the open fracture wound. Patients were followed for a minimum of 6 months to evaluate for fracture-related infection (FRI).

Results: A total of 20 patients were enrolled with minimum six-month follow-up. Eight patients were randomized into the control group (C), 7 in the tobramycin arm (T), and 5 into the vancomycin arm (V). There were 10 Gustilo type II (5C, 2T, 3V) and 10 Gustilo type IIIA (3C, 5T, 2V) open fractures. One nonunion occurred in each group and no FRIs occurred in any group. Five samples were collected between the ED and OR for each patient. 16S ribosome genetic material was successfully isolated from all 100 samples, creating a bacterial genomic library (including antibiotic resistance profiles) of the open fracture wound for each patient.

Conclusion: This study successfully executed a multicenter randomized clinical trial analyzing the administration of intrawound antibiotic powder to open fractures in the ED and its effects on the bioburden in open fracture wounds. A larger and adequately powered study is needed to truly demonstrate the efficacy of antibiotic powder in this setting.

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