Impact of Antibiotic Timing and Duration on Infection Rates After Open Long Bone Fractures in Low- and Middle-Income Countries

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Purpose: Infection rates after open fractures are high, particularly in low- and middle-income countries (LMICs) leading to significant morbidity and health-care costs. While antibiotics reduce infection rates after open fractures, there is no clear consensus on optimal time to administration, or treatment duration. In this study, we aimed to assess whether time from injury to antibiotics and duration of antibiotic prophylaxis are associated with infection rates after intramedullary nailing of open long bone fractures in the SIGN (Surgical Implant Generation Network) Surgical Database (SSDB).

Methods: The SSDB was queried for patients with open tibia and femur fractures between 2017-2023. Patients were included if they were presented within 3 days from time of injury, were >16 years old, and had a minimum 30-day follow-up. Patients were categorized as being given antibiotics within and after 24 hours from time of injury, as well as if their duration of antibiotic prophylaxis was greater than or less than 24 hours. Multivariate logistic regression, controlling for demographic and pertinent risk factors (including sex, age, and Gustillo- Anderson [GA] classification), was used to assess the association between infection and receiving antibiotics within 24 hours of injury, and short (≤24 hours) vs long (>24 hours) course of antibiotic prophylaxis.

Results: A total of 2223 patients met inclusion criteria for our study. In our multivariate logistic regression, patients who received antibiotics after 24 hours from initial injury had 2.66 (95% confidence interval [CI]: 1.08-6.52) times the odds of infection when compared to those who received antibiotics within 24 hours of injury (P = 0.03). There was no significant difference between long and short duration antibiotic prophylaxis (odds ratio [OR]: 1.30, P = 0.26).

Conclusion: Open fractures with a delay in receiving antibiotics of greater than 24 hours are associated with increased risk for developing infection. In contrast, long durations of postoperative antibiotics did not reduce risk of infection. Studies are needed to identify and overcome barriers to early antibiotic administration and reduce duration of postoperative antibiotic usage.