

Does Prophylactic Antibiotic Strategy Affect Outcomes of Type III Open Fractures?

Carlo Eikani; Andrew D. Marten, MS; Aaron K. Hoyt, MD; Robert J. Hand, MS; Hobie D. Summers, MD; Joseph Bowman Cohen; Ashley E. Levack, MD

Purpose: Historically, cefazolin and gentamicin has been the antibiotic strategy of choice for Gustilo-Anderson (GA) type III open fractures. More recently, there has been a shift toward alternative prophylactic strategies to reduce the risk of toxicity associated with gentamicin use. The purpose of this study was to compare rates of fracture-related infection (FRI) and nonunion for type III open fractures receiving perioperative ceftriaxone (CTX) alone versus cefazolin and gentamicin (C/G).

Methods: Patients with type III open fractures of the lower extremity were identified from a single academic Level I trauma center from 2005 to 2022. Patients were included if they received prophylaxis with either CTX or C/G perioperatively. Electronic medical records were reviewed to obtain patient demographics, comorbidities, smoking status, fracture characteristics, and outcomes of FRI and nonunion. Univariable and multivariable logistic regressions were used to estimate the association between antibiotic strategy and the odds of experiencing each outcome, with and without adjusting covariates of sex, GA classification, body mass index (BMI), diabetes, smoking status, and whether the fracture was staged with an external fixator.

Results: 158 patients were included: 76 receiving CTX and 82 receiving C/G. The CTX group had more GA type IIIA fractures (75%) compared to the C/G group (35.4%, $P = 0.0001$). Mean number of debridements was higher in the CTX group (3.6 vs 1.8, $P = 0.001$). The C/G group had a higher percentage of patients with infection (40.2%) and nonunion (26.8%) compared to the CTX group (10.5%, 9.2%, and 14.5%, respectively). On multivariable regression, patients receiving C/G had an estimated 3.78 times higher odds of infection when compared to ceftriaxone when adjusting for GA classification (95% confidence interval [CI]: 1.49, 9.54; $P = 0.0049$). The odds of nonunion were 2.83 times greater for the C/G group when adjusting for BMI and external fixation status (95% CI: 1.09, 7.73; $P = 0.033$).

Conclusion: Our multivariable analysis adjusting for fracture severity demonstrates that ceftriaxone is an acceptable prophylactic strategy for type III open fractures compared to cefazolin with gentamicin. This strategy may result in lower infection and nonunion rates, with fewer drug-related toxicities compared with historical strategies.