Delay of Antibiotic Administration Greater than 2 Hours Predicts Surgical Site Infection in Open Lower- Extremity Fractures

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Purpose: Antibiotic administration, severity of injury, and debridement are associated with surgical site infection (SSI) after internal fixation of open fractures. We sought to validate a time-dependent treatment effect of antibiotic administration.

Methods: Consecutive open fracture patients at a Level-I trauma center with minimum 30-day follow-up were identified from an orthopaedic registry from 2013-2017. The primary end point was SSI within 90 days. A threshold time to antibiotic administration associated with SSI was ascertained by receiver operating characteristic curve analysis. A multivariate Cox proportional hazards model adjusted for open fracture type, smoking, and drug use determined the treatment effect of antibiotic administration within the threshold period.

Results: 10% of 230 patients developed an SSI. There was a trend for patients who did not develop an SSI to receive antibiotics earlier than those who did develop an SSI (61 minutes, IQR [interquartile range] 33-107 vs 83 minutes, IQR 40-186) (P = 0.053). Intravenous antibiotic administration after 120 minutes of presentation of an open fracture to emergency department was significantly associated with a 2.7-times increased hazard of surgical site infection (P = 0.033) within 90 days. On subgroup analysis, the treatment effect of antibiotic administration within 120 minutes held for lower-extremity fractures (HR [hazard ratio] = 4.16, P = 0.006). No significant treatment effect was observed for upper-extremity fractures (P = 0.932).

Conclusion: Antibiotic administration greater than 120 minutes after emergency department presentation of an open fracture was associated with an increased risk of SSI. This risk was compounded for lower-extremity fractures.

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