Majority of Deep Infections After Open and Closed Fracture Are Polymicrobial: PREP-IT Investigators

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Purpose: The results from the PREPARE and A-PREP studies from the PREP-IT investigators were recently published investigating the incidence of surgical site infection (SSI) in open and closed extremity fractures. Secondary analyses are being performed. The purpose of this study is to describe the culture and speciation results of patients with SSI.

Methods: Patients with suspected SSI based on the 2017 US Centers for Disease Control and Prevention National Healthcare Safety Network reporting criteria underwent submission of samples for culture. Analyses were performed for cultures taken from deep or organ tissue. Culture positivity rate was estimated as percentages with exact binomial 95% confidence intervals (CIs). Microbial species are reported as percentages. Comparisons between open and closed fractures were conducted with chi-square tests. P <0.05 was considered statistically significant.

Results: Among the 2 studies, a total of 484 cases (defined as anatomic fracture-area; some patients had multiple fractures, each defined as a "case") had cultures taken from deep or organ tissue. Culture-positive rate was 96.9% (468/484; 95% CI: 94.9-98.3%). There were no statistically significant differences in culture positivity between open (97.5%; 274/281; 95% CI: 94.9%-99.0%) and closed (96.1%; 194/203; 95% CI: 92.4%-98.4%) fractures (P = 0.81). Out of positive cultures, there was information of microbial species for 461 cases (95.2%). For patients with positive cultures, 73.3% (337/461) were polymicrobial infections. Open fractures (76.8%; 205/267) were significantly more likely to be polymicrobial (P = 0.044) compared to infections in closed fractures (68.6%; 134/194). Methicillin-sensitive Staphylococcus aureus (MSSA) was the most common microbe, accounting for 16.5% (236/1427) of all positive cultures. MSSA significantly (P<0.001) accounted for more infections in closed fractures (21.6%; 119/551) as compared to open fracture (13.4%; 117/876).

Conclusion: In patients with suspected SSI, tissue samples yielded microbial culture results. There was a significantly higher incidence of polymicrobial results in open fractures. MSSA was more prevalent in closed versus open fractures. Analysis of incidences of specific microbes in polymicrobial cultures, antimicrobial treatments, and time to infection are ongoing. Clinicians should not hesitate to take deep tissue cultures in patients highly suspicious for infection and be prepared to encounter polymicrobial infections.