Where Are All the Superbugs? Intrawound Powdered Antibiotic Prophylaxis in Open Fracture Care Does Not Drive Patterns of Resistance

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Purpose: Our objective was to determine the consequence of intrawound powdered antibiotic (IPA) prophylaxis at the time of operative fracture care on bacteriology in open fracture cases complicated by surgical site infection (SSI).

Methods: Operative fracture cases were reviewed (Level I, academic, 2018-2020), capturing patient and fracture characteristics, IPA dosing (vancomycin/tobramycin), and SSI details. Fellowship-trained traumatologists used IPAs at their discretion. Cases with <1-month follow-up were excluded.

Results: 713 patients received fracture care for 759 fractures. 144 (19%) were open fractures; 88 (61%) received prophylactic IPAs during surgery. In the open fracture group, there were 16 total SSIs (SSI rate: 10.2% IPA group, 12.5% no IPA group). No patients developed multidrug resistant isolates. There was no statistically significant difference in antibiotic susceptibility profiles of bacterial isolates from either group. No resistant strains of Streptococcus, Enterococcus, gram-negative enterics, Pseudomonas, or Cutibacterium species developed. Two isolates of methicillin-resistant Staphylococcus aureus (MRSA) developed in each group, and a single isolate of resistant coagulase-negative Staphylococcus developed in the IPA group. There were no SSIs in type 1 open fracture cases, with increasing infection rates in type 2 (5.1% IPA group, 8.3% no IPA group) and type 3 (17.5% IPA group, 23.8% no IPA group) open fracture cases. There was no difference in IPA dosing (mean vancomycin/tobramycin: 1.7 g/1.8 g IPA-SSI group, 1.6 g/1.8 g IPA-no SSI group; $P = 0.72$) or Gustilo-Anderson classification ($P = 0.33$).

Conclusion: The use of local antibiotic prophylaxis resulted in no measurable increase in bacterial resistance in operative treatment of open fractures. There was a trend toward decreased rate of SSI requiring operative debridement with the use of IPAs. This is a critical safety finding for the development of drug trials for open fracture prophylaxis with IPAs.

Figure 1: Infection Requiring Operative Debridement – Open Fractures

	IPA Total infections=9 Bacterial isolates=18	No IPA Total infections=7 Bacterial isolates=14
Staphylococcus aureus		
MSSA	3	1
MRSA	2	2
Coagulase negative staphylococcus species		
No resistance	2	1
Oxacillin Resistant	1	0
Streptococcus species	0	1
Enterococcus species	2	2
Cutibacterium (P. acnes)	0	1
Other - Gram positive	1	1
Gram negative enterics (Klebsiella, Enterobacter, E. Coli, Proteus)	3	2
Pseudomonas species	1	1
Other - Gram negative	2	2
Fungal	1	0
Polymicrobial (species represented above)	5	3

No resistant strains of streptococcus, enterococcus, gram negative enterics, pseudomonas, or cutibacterium species

POSTER ABSTRACTS

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