Vancomycin and Cefepime Antibiotic Prophylaxis for Open Fractures Reduces the Infection Rates in Grade III Open Fractures Compared to Cefazolin and Gentamicin, Avoids Potential Nephrotoxicity, and Does Not Result in Antibiotic Resistance with MRSA

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Background/Purpose: Historically, Cefazolin with or without Gentamycin has been used for prophylaxis against post-traumatic infection after open fractures. While S. Aureus (SA) has traditionally been the most prevalent causative organism, there has been a notable increase in the prevalence of methicillin-resistant S. Aureus (MRSA). The purpose of this analysis is to report on the results of a new antibiotic prophylaxis regimen at a single institution using Vancomycin and Cefepime for open fractures.

Methods: Retrospective review of all patients requiring operative management of open fractures at a single institution between 2008 and 2013. Group 1 (CG) patients (2008-2010) received cefazolin and gentamicin as antibiotic prophylaxis for open fractures. Group 2 (VC) patients (2011-2013) received vancomycin and cefepime as antibiotic prophylaxis for open fractures. Patients not receiving their initial treatment at this institution were excluded from the analysis. Hospital records were reviewed to collect data regarding the nature of injury, grade of open fracture, and type of prophylactic antibiotic administration. Microbiology records were analyzed for the causative organisms for each patient who subsequently developed an infection, as well as the minimum inhibitory concentration (MIC) for vancomycin in MRSA cases we identified from year to year, looking for increased antibiotic resistance.

Results: There were 37 infections (5.5%) after 670 open fractures in group CG and 35 infections (4.0%) after 869 open fractures in group 2 VC (p=0.18). For open grade III, CG yielded an infection rate of 6.8% whereas the infection rate for VC group was 3.1% (p=0.03). Similar infection rates were seen in open grades I and II. Polymicrobial infection was found to be present in 48.6% (n=18) of all infection in CG group, and 28.5% (n=10) in VC group (p=0.22). Staphylococcus aureus remained the most prevalent pathogen isolated in open fractures in both groups. Eight of 37 (21%) infections in CG, and 8 of 35 (23%) infections in VC were positive for MRSA (p=1). Ten of 37 (27%) infections in CG, and 8 of 35 (23%) infections in VC were Methicillin Susceptible Staphylococcus Aureus (MSSA) (P=0.78). There were statistically more infections in CG group with Enteroccocus (6 CG, 0 VC) (P=0.02) and Pseudomonas (9 CG, 2 VC) (P=0.04). Acute kidney injury was not seen in any patient with normal renal function at admission (P=1). Minimum inhibitory concentration for Vancomycin for all patients with MRSA infection remained less than 1 for each of the six years evaluated, even after transition to vancomycin and cefepime.

Conclusions: Vancomycin and Cefepime regimen is superior to Cefazolin and Gentamicin for infection prophylaxis in Grade III open fractures. Vancomycin and Cefepime did not significantly decrease the incidence of polymicrobial infections after open fracture, but there was certainly a trend towards reduction. Forty-eight hours of antibiotic prophylaxis does not seem to affect renal function in patients with normal creatinine levels at the time of admission, regardless of the class of antibiotic employed. Vancomycin can be safely used for coverage of gram positive organisms without an increase in antibiotic resistance.

See pages 47 - 108 for financial disclosure information.