Optimal Antibiotic Dose in Two-Stage Exchange for Periprosthetic Joint Infection

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INTRODUCTION: In two-stage exchange for periprosthetic joint infection (PJI), the addition of antibiotics to cement spacers is considered standard of care; however, little is known about optimal dosage. There is emphasis on using >3.6g of total antibiotic, including >/=2g of vancomycin, per 40g of cement, but these recommendations lack clinical evidence. We examined whether commonly recommended antibiotic doses in spacers have any effect on treatment success.

METHODS: This was a retrospective review of patients who underwent two-stage exchange for PJI at a single institution from 2004-2020 with at least one-year follow up after initial spacer placement. Exclusion criteria were patients with a mega-prosthesis, those who had a spacer placed at an outside institution, and those who did not have information on specific antibiotic spacer dosing. Patients were separated into high (>3.6g of total antibiotic per 40g of cement) and low dose spacer groups. Data was collected on demographics, comorbidities, surgical details, culture information, complications, and treatment outcome. Primary outcomes included overall and infectious failure. Overall failure included patients who were not reimplanted, underwent unplanned reoperation for any reason, or died. Infectious failure included patients who underwent another surgery for persistent infection. Secondary outcomes included no reimplantation, mortality, and readmission for acute kidney injury. Univariate associations were analyzed through multivariate logistic regression to determine predictors of overall and infectious failure. Separate analyses were run for total antibiotic dose and for individual vancomycin and aminoglycoside doses.

RESULTS: A total of 207 patients met inclusion criteria, 59% of which were total knee arthroplasties and 33% of which were revision arthroplasties. High dose spacers were used in 80% of patients. High dose spacers were more likely to contain tobramycin (92% vs. 78%, p=0.009) and were more likely to be composed of Palacos cement (p<0.001). The overall treatment failure rate for the entire cohort was 43%, and the infectious failure rate was 31%. There were no differences in primary or secondary outcomes between high and low dose total antibiotic groups. However, in univariate analysis by individual antibiotic, vancomycin dose >/=2g was associated with decreased rate of overall (OR=0.447, p=0.031) and infectious failure (OR=0.355, p=.007). In multivariate analysis, vancomycin dose >/=2g remained significant for reducing infectious failure (OR=0.327, p=0.015) but not overall failure (OR=0.507, p=0.125). Aminoglycoside dose demonstrated no association with overall or infectious failure.

DISCUSSION AND CONCLUSION: During two-stage exchange for PJI, total antibiotic spacer dose may be less important than vancomycin dose in preventing infectious failure. Using at least 2g of vancomycin per 40g of cement could decrease the risk of failure due to persistent infection.