Intraosseous Vancomycin For Primary Total Knee Arthroplasty Is Associated With A Lower Rate Of Postoperative Acute Kidney Injury Compared To Intravenous Vancomycin

Introduction: Vancomycin administration as a perioperative antibiotic can be difficult to time and can lead to adverse systemic effects. Intraosseous vancomycin (IOV) is becoming increasingly utilized for total knee arthroplasty (TKA) prophylaxis. The primary purpose was to compare the rate of acute kidney injury (AKI) following primary TKA that utilized IOV or intravenous vancomycin (IVV).

Methods: A single-institution retrospective review was conducted on 4,184 primary TKAs from 7/2016 to 11/2024 that received IOV (1,297 cases) or IVV (2,887 cases) as part of antibiotic prophylaxis. All included patients had a basic metabolic panel on postoperative day one. Patients were excluded if they had a solid organ transplant, were on dialysis, or received a blood transfusion following TKA. AKI was defined as a creatinine increase of 0.3 mg/dL from baseline. Patient demographics, comorbidities, and operative characteristics were compared between groups. Data was analyzed using independent samples t-tests and chi-square analyses. Logistic regression was used to identify significant risk factors for AKI.

Results: The rate of AKI was lower in the IOV compared to the IVV group (1.9% versus 3.3%, P=0.017). Patients who developed AKI had longer hospitalizations (59.9 ± 39.1 hours versus 42.1 ± 33.3, P<0.001) and higher likelihood of discharge to skilled nursing facilities (10.1% versus 3.0%, P<0.001) compared to non-AKI patients. Logistic regression demonstrated that IVV (odds ratio [OR]: 1.87; 95% confidence interval [CI] 1.09-3.21), BMI (OR 1.09; 95% CI 1.05-1.13), and postoperative blood urea nitrogen (OR 1.29; 95% CI 1.24-1.35) were significantly associated with AKI. No adverse events were observed due to the IO technique.

Discussion: The use of vancomycin in addition to cefazolin as part of a preoperative dual antibiotic prophylactic regimen for TKA is an effective means to decrease the rate of PJI. Intraosseous vancomycin has become a popular manner of administration with numerous studies reporting promising results and minimal risks. However, only a few studies have specifically compared the ramifications of IOV compared to the more traditional IVV route. Our study corroborates the findings of previous IOV studies, which are that the intraosseous technique is safe and does not increase the risk of vancomycin-associated AKI. We found that AKI occurred less frequently following primary TKA during cases that utilized IOV compared to IVV. This confirms our hypothesis and further characterizes IOV as a safe and effective alternative to IVV.

Significance/Clinical Relevance: The use of IOV was associated with a significantly lower rate of AKI following primary TKA when compared to IVV. Administering vancomycin with an IO technique avoids the difficulties of incomplete administration prior to incision and reduces systemic side effects.