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CORR Insights

CORR Insights®: Addition of Vancomycin to Cefazolin Prophylaxis Is Associated with Acute Kidney Injury After Primary Joint Arthroplasty

Han-Xiao Zhu MD, Xun-Zi Cai MD

Where Are We Now?

Infection after total joint arthroplasty (TJA) is a devastating complication that causes tremendous morbidity and accounts for a substantial proportion of orthopaedic healthcare expenditures. The treatment of periprosthetic infection also can be a source of considerable unease and confusion for arthroplasty surgeons. The proportion of patients who develop infection after TJA is low, at approximately 1% to 2% [8, 10]. Surgeons can help keep the risk of infection low by using appropriate perioperative antimicrobial prophylaxis, laminar airflow, antibiotic-impregnated cement, and decreased traffic in the operating room. Although patients, and to some degree even the healthcare system in the United States, seem to have an expectation that this complication should never occur, the reality is that prosthetic infection is unlikely to be eliminated in the next few years. The choice of antimicrobial regimen is currently based on the results of experimental studies and clinical experience, but we still lack randomized clinical trials (RCTs) [2–4].

It has been suggested that in some settings, particularly those in which the local antibiogram includes a high proportion of infections with methicillin-resistant *Staphyloccus aureus* (MRSA), vancomycin may be appropriate for prophylactic antibiotic regimens [1, 7]. However, researchers have observed complications in patients with routine administration of vancomycin including resistant bacteria, acute kidney injury, and hearing loss. Moreover, Vancomycin needs to be combined with traditional prophylactic agents in order to provide coverage against Gram-negative bacteria. The benefits to adding vancomycin to prophylactic regimens is still hotly debated [5–7].

In this study, Courtney and colleagues retrospectively evaluated a series of 1828 patients undergoing primary hip and knee arthroplasty during a 2-year period. These patients received either cefazolin (n = 500) or cefazolin and vancomycin (n = 1328) as prophylactic perioperative antibiotics. The patient characteristics, case mix, and preoperative renal function and baseline creatinine clearance were

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H.-X. Zhu MD, X.-Z. Cai MD (✉)
Department of Orthopedic Surgery, Second Affiliated Hospital's Campus in Binjiang District, School of Medicine, Zhejiang University, No. 1511 Jianghong Road, Hangzhou 310009, People's Republic of China
e-mail: emilcai@hotmail.com

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similar between the two groups. A multivariate logistic regression model was used to identify potential independent risk factors. Results showed that patients who received dual antibiotics were more likely to develop acute kidney injury than those receiving cefazolin alone. Patients in the dual antibiotic group had higher rates of Grades II and III acute kidney injury. Controlling for confounding variables showed dual antibiotic prophylaxis, American Society of Anesthesiologists classification, and preoperative kidney disease to be independent risk factors for acute kidney injury after primary arthroplasty.

Where Do We Need to Go?

This high-volume and high-quality retrospective study provided dependable results. On the surface, this study appears to validate the concept that dual antibiotic regimen including vancomycin increases the risk of acute kidney injury. Additionally, a previous study of this series of patients has shown that the addition of vancomycin to the prophylactic antibiotic regimen did not result in less surgical site infections than cefazolin alone [6]. This was consistent with other studies [5, 9]. Consequently, the routine use of vancomycin should be questioned, weighing the potential benefits of decreased MRSA infection rate against the adverse effects of renal toxicity, as proposed in the paper by Courtney and colleagues.

Clearly, the ideal treatment plan of the prophylactic regimen for joint arthroplasty has yet to be outlined. One study alone can not provide a firm conclusion.

How Do We Get There?

Well-designed RCTs are the gold standard. The choice of antimicrobial regimens is based on the result established from experimental studies and clinical experience, but randomized studies are rare [2–4]. Courtney and colleagues provided a high-quality retrospective study, which could not completely eliminate the selection bias and was unable to identify the definitive cause of acute kidney injury. In light of the extremely low incidence of prosthetic infections and acute kidney injury after joint arthroplasty, RCTs may be too expensive and time consuming. Combining and analyzing data from registries or a multicenter retrospective study may be good alternatives. Large volumes can effectively decrease the bias. These kinds of studies may address: (1) Whether the addition of vancomycin to the prophylactic antibiotic regimen can decrease the rate of surgical site infection better than other antibiotic alone; and (2) which factors may increase the rate of acute kidney injury.

Above all, the optimal algorithm for each patient should be the result of considering the MRSA prevalence of the specific hospital, the preoperative kidney function of the patient, and the cost-effectiveness of antibiotic regimens.

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