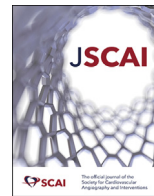




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Editorial

Acute Kidney Injury and TAVR: Time to Turn Down the (Contrast) Volume

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Contrast-associated acute kidney injury (AKI) is well-established as a risk factor for morbidity and mortality following cardiac procedures, including percutaneous coronary intervention and cardiac surgery.¹ Previous studies have demonstrated that the risk of contrast-associated AKI is less in transcatheter aortic valve replacement (TAVR) patients than that in patients undergoing percutaneous coronary intervention.² In fact, it has been suggested that the chronic kidney disease (CKD) stage remains the same or may improve after procedure, likely due to the improvement in hemodynamics following TAVR.³ However, approximately 10% of patients who undergo TAVR suffer from AKI after procedure, and it has been previously shown that AKI following TAVR is associated with increased 1-year mortality.⁴

In this issue of *JSCAI*, Gualano et al⁵ evaluated the incidence, risk factors, survival, and contrast dose relation to the development of in-hospital AKI after TAVR. The data were derived from the Michigan statewide registry using Transcatheter Valve Therapy outcomes and adjusting for patient characteristics.

Of 7112 cases performed between 2016 and 2019, AKI occurred in 629 (8.8%). In-hospital AKI was significantly associated with the risk of 1-year mortality. Additionally, by evaluating the ratio of contrast volume to baseline estimated glomerular filtration rate (CV/eGFR), CV/eGFR >2 and CV/eGFR >3 were associated with AKI. There was also a correlation between the use of general anesthesia for TAVR and the risk of developing AKI.

In this study, the mean volume of contrast media was 106.4 mL and was 112.7 mL in the patients who experienced AKI. As mentioned by the authors, it is possible to significantly reduce CV during TAVR procedures. In current practice, CV is usually limited to <50 mL, especially in those with underlying CKD. In fact, if needed, TAVR can be performed without the use of contrast by utilizing transesophageal echo and fluoroscopic guidance. Some methods to reduce CV may include excluding peripheral angiography, use of 2 pigtailed catheters to delineate the sinus anatomy, and avoidance of predilation.⁶ Implementation of these procedural techniques is imperative, especially in patients with baseline CKD, and is confirmed in this study. Other intraprocedural

factors that could contribute to renal dysfunction are duration of and need for rapid pacing, type of valve being implanted, hypotension during or after the procedure, and potential vascular complications requiring peripheral intervention and additional contrast administration. Furthermore, consideration should be given to the preprocedural evaluation of TAVR patients, which could impact renal function. This includes limited prehydration for those with baseline CKD and staging the preprocedural evaluation for TAVR patients, including computed tomography angiography and coronary angiography.

A limitation of the current study is that patients were included starting in 2016, which represents only intermediate- and high-risk TAVR cohorts rather than the current era where TAVR is commercially approved for low-risk patients.^{7,8} The mean Society of Thoracic Surgeons score was 5.8% in this patient population, although the overall surgical risk was not reported. Low-risk TAVR patients tend to have fewer comorbidities, and AKI is known to be associated with comorbidities that make patients higher risk, such as diabetes and CKD. Therefore, these data may not be as applicable to a low-risk TAVR population.

Interestingly, severe tricuspid regurgitation was found to be an independent predictor of AKI. With the current focus on transcatheter tricuspid valve therapies, the need for additional treatments to address concomitant right-sided valve disease merits further investigation.

Utilizing and reporting the CV/eGFR ratio for patients undergoing TAVR, as proposed in the present study, may encourage operators to become more aware of the individual patient's risk of contrast administration and alter preprocedural and intraprocedural techniques that would mitigate risk. Further prospective studies are needed to validate this risk prediction model to avoid AKI and mortality and potentially improve outcomes in the increasing TAVR population.

Declaration of competing interest

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