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EDITORIAL COMMENT

Transcatheter aortic valve replacement: Protect the kidneys to protect the patient

Vijay Kumar MD, DNB (Cardiology) | Ashok Seth FRCP, MSCAI, FESC, DSc

Interventional Cardiology & Structural Therapies, Fortis Escorts Heart Institute, New Delhi, India

Correspondence
Ashok Seth, Interventional Cardiology & Structural Therapies, Fortis Escorts Heart Institute, Okhla Road, New Delhi 110025, India.
Email: ashok.seth@fortishealthcare.com

Key Points

- Transcatheter aortic valve replacement (TAVR) seems superior to surgical aortic valve replacement (SAVR) for intermediate-term outcomes in patients with aortic stenosis and moderate to severe chronic kidney disease (CKD).
- Intermediate-term mortality and the major adverse cardiac and renal event increase if the renal function worsens soon after TAVR or SAVR.
- Patient's demographic profile, comorbid conditions, and procedural characteristics influence the clinical outcomes emphasizing the need for careful risk assessment in deciding TAVR versus SAVR in CKD patient.

Transcatheter aortic valve replacement (TAVR) is now an accepted treatment option for high and intermediate risk elderly patients suffering from severe aortic stenosis (AS). However, should it be the preferred modality of treatment for AS patient with chronic kidney disease (CKD) remains unclear.

Several observational studies and retrospective analysis of landmark trials have shown that TAVR has lower mortality, less acute kidney injury, and shorter length of hospital stay when compared to surgical aortic valve replacement (SAVR) in the high-risk patients with CKD in the short-term follow-up.[1–4] Nguyen and associates[2] showed an advantage of TAVR in patients with an eGFR less than 60 mL/min/1.73 m^2 and observed that TAVR has excellent outcomes at 5-years and renal failure is not predictive of adverse outcomes when compared to SAVR. On the other hand, in the OBSERVANT study, although there was increased acute kidney injury in the postoperative period, the SAVR patients had better early and late survival at 2-years. This study concludes that when the operative risk is not prohibitive, SAVR is an excellent choice in patients with advanced kidney disease. As these were not prospective randomized studies, they were only hypothesis generating rather than a proof.[1]

In this issue of Journal, Pineda et al[5] have discussed on the analysis of the Core Valve U.S. Pivotal High-Risk Trial and Continued Access Study and have demonstrated a superiority of TAVR over SAVR in patients with CKD. Sixty percent of the high-risk patients in both groups had moderate or severe CKD in their study. A lower rate of major adverse cardiac and renal event (MACRE) was observed in TAVR group (42.1% vs. 51.0%, $p = 0.04$) at 3-years. Acute kidney injury (AKI) and life-threatening bleeding were higher in SAVR group whereas vascular complications and need of pacemaker were higher in TAVR group. If there is worsening of kidney function immediately after the TAVR, it is associated with higher MACRE rate, all-cause mortality, and major bleeding at 3-years. The article further throws light on baseline clinical factors and several procedural factors that influence one-year all-cause mortality amongst moderate or severe CKD patients. The authors have identified covariates like albumin<3.3 g/dL, male sex, BMI < 21, fall, home oxygen, assisted living residents, mitral regurgitation, tricuspid regurgitation, STS > 7%, and a large volume of iodinated contrast used or an alternate access route TAVR as indicators like to be associated with adverse outcome. We need to keep in mind the limitations of the study that it is a post hoc analysis, in a small cohort of severe CKD patients, there were patients on dialysis, or exclusion of those with eGFR<20 mL/min/1.7 cm^2.

The baseline eGFR is an essential factor that influences the outcomes of both TAVR and SAVR. We should also know that there are numerous factors that could increase the chances of adverse outcomes at TAVR, that is, older age, severity of preexisting chronic kidney disease, short-interval contrast exposure, congestive heart failure, peripheral vascular disease and diabetes. Intraprocedural factors like bleeding, blood transfusion, embolic events, contrast agents, hypotension from rapid ventricular pacing, nontransfemoral route, complicated cases requiring intra-aortic balloon pump or ECMO will also result in increased MACRE. Finally, the post-procedural factors like inotropes, nephrotoxins, decreased cardiac output, hemodynamic instability, grade of aortic regurgitation after the procedure could worsen CKD from AKI. SAVR outcomes also are affected adversely by longer duration of anesthesia, the extent of surgery and use of cardiopulmonary bypass in patients with moderate to severe CKD.

Outcomes of TAVR and SAVR can improve for these high-risk patients with CKD by adopting proper risk stratification tools during patient selection, and strategies to prevent acute kidney injury should be practiced and implemented. Simple measures like pre-procedure hydration, minimizing repeated exposure to contrast at short intervals and

limiting the volume of iodinated contrast, avoiding hypotension during the procedure, avoiding major bleeding, excessive blood and blood products transfusion, should be adopted while performing TAVR. Forced diuresis with matched hydration and renal embolic protection devices are some newer concepts for preventing acute kidney injury in the CKD population. Treatment decisions should be individualized with consensus from a multidisciplinary heart team, taking into account patients comorbidities, frailty, and quality of life as well. Whether TAVR or SAVR is more appropriate for the high-risk patients with significant CKD can only be clarified through prospective randomized trials utilizing best renal protective practices and analyzing the long-term follow-up of the outcomes as defined by Valve Academic Research Consortium (VARC) I and II. However, we doubt that these will ever be performed. Thus, the current data are important for our daily practice as it reinforces the relative safety as well as superior outcomes of TAVR over SAVR even in high-risk patients with CKD.

CONFLICT OF INTEREST

Dr Ashok Seth is a Proctor for Medtronic TAVR Programme.

ORCID

Ashok Seth https://orcid.org/0000-0001-6883-0287

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