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ORIGINAL ARTICLES

Redo Aortic Valve Replacement After Prior Transcatheter versus Surgical Aortic Valve Replacement: Insights from Western Experience

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Abstract

Introduction: The demand for reoperation on the aortic valve in Albania is rising, mirroring the increasing average age of the population and the subsequent rise in patients requiring aortic valve surgery. This trend underscores the need for this informative article, which aims to provide insights into the risks and outcomes of aortic valve reoperations, particularly in light of efforts by interventional cardiologists to expand the indications for TAVR to younger and lower-risk patients. Data from the Society of Thoracic Surgeons (STS) National Database reveal results that warrant attention, with concerns over reoperations after TAVR growing, mainly due to the uncertain feasibility of repeat TAVR.

This article presents a novel perspective on the risks associated with surgical aortic valve replacement (SAVR) after prior TAVR or SAVR. It underscores the urgent need to develop an optimal strategy for managing these patients and offers fresh insight.

Material and Methods: Our research, based on a comprehensive analysis of data from the Society of Thoracic Surgeons in the USA's 10-year database, included individuals who underwent bioprosthetic SAVR following prior TAVR and/or SAVR. Our analyses, which included total and isolated SAVR groups, focused on the primary outcome of operative mortality, ensuring the reliability and thoroughness of our study.

Results: The study included 31,106 patients who underwent SAVR. Among them, 1,126 had prior TAVR (TAVR-SAVR), 674 had undergone SAVR followed by TAVR and SAVR (SAVR-TAVR-SAVR), and 29,306 had undergone prior SAVR (SAVR-SAVR). Matched analysis for isolated SAVR cases showed a 1.74-fold higher operative mortality for TAVR-SAVR than SAVR-SAVR (P = 0.020). In our center, 5 cases have been performed in the last two years with excellent results, no losses, and operating times close to the first-time interventions.

Conclusions: This study's findings significantly contribute to the field. They could influence clinical practice, particularly for patients with longer life expectancies and anatomy unsuitable for TAVR. They suggest an initial SAVR approach may provide better results even in necessary surgical re-interventions on the aortic valve.

Keywords: TAVR, SAVR, Aortic Valve Reoperation

Introduction

Since being approved as an alternative to surgical aortic valve replacement, transcatheter aortic valve replacement (TAVR) has increased even in low-risk patients, but at the expense of surgical aortic valve replacement (SAVR). [1] The placement of TAVR remains unclear regarding its long-term effects, as the median age in clinical studies was 80 years. [2]

For patients undergoing valve replacement, we must first assess whether the patient's life expectancy exceeds the expected life expectancy of the prosthesis. [3]

Second, statistics on the long-term viability of TAVR and the prognosis for patients with failure TAVR valves remain unclear.[4]

The prevalence of endocarditis is comparable after SAVR and TAVR, but a limited number of patients with post-TAVR endocarditis had surgical intervention, highlighting

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this distinct trend. [5]

In patients with a 10-year life expectancy, structural valve degeneration, paravalvular leakage (PVL), and endocarditis should increase the likelihood of reintervention. [6]

What should SAVR or TAVR patients choose first? High-volume institutions may redo SAVR after de novo SAVR with the same mortality risk as primary SAVR. Unlike SAVR repair after TAVR, in individuals without adequate aortic root anatomy for redo-TAVR repair. [7]

This article illustrates the risk assessment of redoing SAVR after prior TAVR (TAVR-SAVR) versus SAVR. Reoperation is also performed in patients with a TAVR-to-SAVR (ViV) valve. This research compares the risk of TAVR-SAVR versus SAVR-SAVR.

Materials and Methods

The data for this study were obtained from the Society of Thoracic Surgeons National Database Participant File Search Program (STS) and analyzed at the investigators' institutions.

Patient Population

Data included all SAVR patients with previous aortic valve procedures. Data included the STS Adult Cardiac Surgery Database (2011-2021). The PUF data file had 48,220 patients. [7]

Prior patient procedures (TAVR and SAVR) were based on initial valve procedure, explant type, device, and urgent/emergent cause. Previous non-bioprosthetic valve (mechanical, homograft, autotransplant, unknown, or repair), endovascular procedures, emergency valve explant TAVR, unplanned SAVR, ventricular transplants/assistance devices, aortic root replacement, and non-aortic valve pathology were excluded. After exclusion, 29,306 patients had prior SAVR, and 1800 had prior TAVR. Patients were categorized according to previous TAVR, SAVR, or both.[7]

Results

Current trends in reoperation after TAVR and SAVR Of the 31,106 patients analyzed, 29,306 had a prior SAVR, 1,126 had a prior TAVR, and 674 had a prior SAVR plus TAVR.[7]

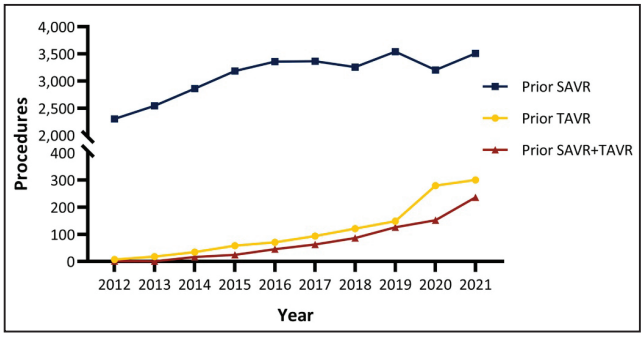

Figure 1. Shows trends over time for each group.[7]

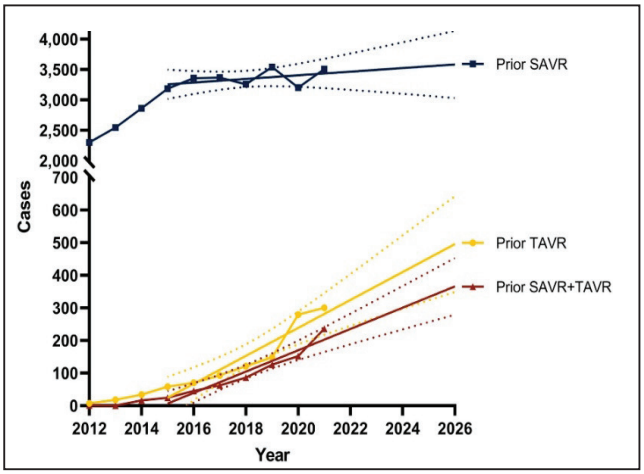

Figure 2. Shows historical trends and forecasts for 2026.[7]

Baseline and operative characteristics for Surgical Reinterventions after TAVR and SAVR

The TAVR-SAVR and SAVR-TAVR-SAVR groups were older and had higher comorbidities, multivalvular disease, and coronary artery disease. The SAVR-TAVR-SAVR group has a similar risk profile to the TAVR-SAVR and SAVR-SAVR groups, although no individual comparisons were made. The TAVR-SAVR group had the

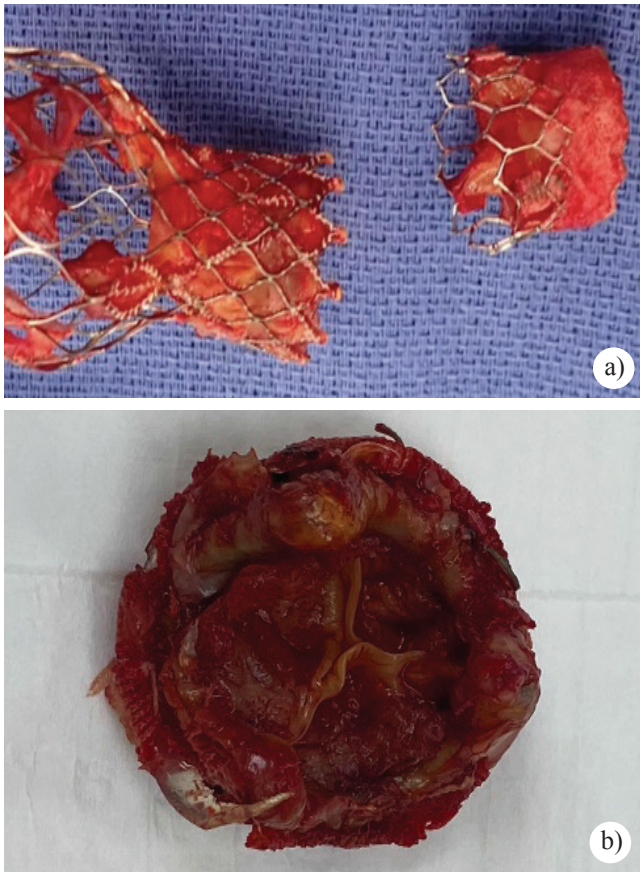

Figure 3: a) Explanted degenerated TAVI b) Explanted degenerated aortic bioprosthesis

oldest mean age at 74 years, followed by SAVR-TAVR-SAVR at 71 years and SAVR-SAVR at 67 years (P < 0.0001). Similar disparities were seen in the frequencies of insulin-dependent diabetes (15% vs. 13% vs. 9%; P < 0.0001) and moderate-to-severe chronic pulmonary disease (17% vs. 14% vs. 12%; P < 0.0001).[8, 9]

Unadjusted Results for Surgical Reinterventions after TAVR and SAVR

TAVR-SAVR patients had the highest operative mortality rate (17%), followed by SAVR-TAVR-SAVR patients (12%) and SAVR-SAVR patients (9%, P < 0.0001). [7]

The rates of severe morbidity for TAVR-SAVR, SAVR-TAVR-SAVR, and SAVR-SAVR were 37%, 31%, and 28%, respectively. SAVR-SAVR had lower component complications, length of stay, and readmission rates than TAVR-SAVR.[7]

Isolated SAVR subgroup analysis

Risk-adjusted analysis showed that TAVR-SAVR had more significant operative mortality (OR: 1.9) and greater morbidity (OR: 1.3) than SAVR-SAVR.[7]

TAVR-SAVR had 11.3% operative mortality compared with 6.7% for SAVR-SAVR (P = 0.020), corresponding to an OR of 1.7 (95% CI: 1.1–2.9). The risk of significant morbidity was similar in all groups (28% vs. 24%; P = 0.223). For patients with severe STS disease, the TAVR-SAVR group had a higher rate of salvage failure (32% vs. 16%; P = 0.008). TAVR-SAVR patients had more excellent rates of renal failure, longer intensive care unit stays, and fewer home discharges. [7, 8, 9]

Discussions

Although TAVR has higher valve reintervention rates than SAVR, previous TAVR/SAVR studies did not report them. In these studies, reintervention rates were calculated without including major risk events (ex, death) during follow-up, even though many patients died within 5 years.

In the NOTION (Nordic Aortic Valve Intervention) study, TAVR patients had 13.9% structural valve deterioration after 8 years, compared with 28.3% for SAVR patients (P = 0.0017). Despite the substantial difference in the rate of structural valve degradation, SAVR and TAVR had identical rates of bioprosthetic valve failure (valve-related mortality, reintervention, or degeneration).[10]

Landes et al. documented 212 redo-TAVRs in 37 centers with a frequency of 0.3% (212/63,876) in one of the most extensive data sets. Despite the positive results, this research did not exclude patients lacking adequate anatomy for redo-TAVR or patients without technical success.[11]

The international EXPLANTORREDO-TAVR registry reported clinical outcomes in 396 patients from 29 sites: 181 (46%) with reoperations and 215 (54%) with re-TAVR. This was the first study to show re-TAVR and reoperation across centers. [12, 13, 14]

In patients over 80 years of age, the American College of Cardiology/American Heart Association recommends transfemoral TAVR initially. [12]

Patients 65-80 should choose TAVR or SAVR after shared decision-making. [15, 16]

Many patients in the latter group will outlive their TAVR valves. The main question remains unsettled for patients with SAVR and TAVR options: "What is the optimal choice of the first valve?" Previous studies of the STS database showed increased mortality after reoperation after TAVR.

FinnValve, *Laakso, et al*. examined the incidence of PVL and the prognostic effect after TAVR. Small PVL by transthoracic echocardiography was associated with worse survival in this multicenter study. Transthoracic echocardiography may underestimate mild PVL, so we grade it from mild to moderate to severe. [17]

In this context, the results of this study provide data for decision-making regarding the patient's management throughout his life. The results demonstrate the importance of carefully evaluating concurrent cardiac pathologies and aortic root anatomy during the initial evaluation for TAVR.

Conclusions

This study highlighted the increased risk of reoperation in patients after TAVR compared to patients after SAVR, providing a crucial perspective for the initial choice of valves in lifelong treatment. The importance of TAVR in treating aortic stenosis has extended to lower-risk patients, leading to a significant projected increase in post-TAVR reoperations over the next decade. Increasing numbers of post-TAVR reoperations reflect an at-risk population high. The multidisciplinary team concept for TAVR remains vital. For patients with a longer life expectancy (especially over 10 years) and anatomy unsuitable for TAVR, an initial SAVR approach may provide better results even in necessary surgical re-interventions on the aortic valve. We emphasize that in our center, the number of mini-invasive interventions for aortic valve surgery is moving towards routine, reducing trauma and hospital stay with minimal mortality and morbidity, making TAVR competitive even for older and high-risk patients.

COI Statement: This paper has yet to be submitted in parallel, presented fully or partially at a meeting, podium, or congress, published, or submitted for consideration beforehand.

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Patient consent: The patient's consent was obtained for the publication of the case.

Abbreviation

TAVR - Transcatheter Aortic Valve Replacement; STS - Society of Thoracic Surgeons'; SAVR - Surgical Aortic Valve Replacement; PVL - Paravalvular Leakage; NOTION - Nordic Aortic Valve Intervention;

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