patients at low surgical risk, of younger age, and with longer life expectancy, the longitudinal outcomes of these adverse events will play a significant role. The low-risk trials for TAVR plan to follow patients out to 10 years, and the midterm results should be available in the next 2 to 3 years to shed further light of the results of TAVR and surgical AVR (SAVR) in this low-risk patient population. As long as TAVR has at least equivalent intermediate-term results to SAVR, patients will continue to demand this less invasive option.

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Commentary: Mid-term outcomes in a real-world transcatheter aortic valve replacement population

Rachel Eikelboom, MD,
Aaron J. Spooner, MD, MEHP, MMgt, and
Michael H. Yamashita, MDCM, MPH

Rachel Eikelboom, MD, Aaron J. Spooner, MD, MEHP, MMgt, and Michael H. Yamashita, MDCM, MPH

In this edition of the *Journal*, Percy and colleagues¹ present a series of 866 patients who underwent transfemoral transcatheter aortic valve replacement (TAVR) at Brigham and Women's Hospital between 2011 and 2018. The authors compared 5-year survival in patients with and without peri-procedural complications. The complications of interest were periprocedural stroke, paravalvular leak (PVL), new

CENTRAL MESSAGE

Midterm survival after TAVR is lower in high- and intermediate-risk patients who have a severe perioperative stroke. The impact of complications on outcomes in low-risk patients requires more study.

left bundle branch block, and permanent pacemaker (PPM) implantation. These complications appear to occur more frequently after TAVR than surgical aortic valve replacement (SAVR) in some randomized trials.²⁻⁴ Their impact on long-term prognosis is of particular concern in younger, low-risk patients who would also be excellent candidates for SAVR, which has proven excellent long-term outcomes.⁵

Patients in this study had a mean age of 80 years, a mean Society of Thoracic Surgery surgical risk score of 4.8%, and were followed for a median of 36 months. Stroke

From the Department of Surgery, Max Rady College of Medicine, University of Manitoba; and Cardiac Sciences Program, St Boniface Hospital, Winnipeg, Manitoba, Canada.

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Address for reprints: Michael H. Yamashita, MDCM, MPH, Department of Surgery, Max Rady College of Medicine, University of Manitoba, Y3519 – 409 Tache Ave, Winnipeg, Manitoba, Canada R2H 2A6 (E-mail: myamashita@sbgh.mb.ca).

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TABLE 1. Periprocedural complications in Percy and colleagues compared with PARTNER 2

	Percy and colleagues	PARTNER 2 ^{2,6}	Evolut intermediate risk ⁷
Number of patients who received TAVR	866	1011	864
Mean age, y	80	82	80
Mean STS score	4.8%	5.8%	4.5%
Operative mortality	2.8%	0.9%	2.8%
1-y mortality	11.8%	12.3%	6.7%
5-y mortality	22.3%	46%	N/A
30-d stroke	3.9%	5.5%	3.4%
30-d disabling or severe stroke	0.8%	3.2%	1.2%
Greater-than-mild PVL	4.4%	3.7%	53%
PPM insertion	7.9%	8.5%	25.9%

PARTNER, Placement of Aortic Transcatheter Valves; TAVR, transcatheter aortic valve replacement; STS, Society of Thoracic Surgeons; N/A, not available; PVL, paravalvular leak; PPM, permanent pacemaker.

occurred in 3.9% of patients (with severe stroke in 0.8%), greater-than-mild PVL in 4.4%, new left bundle branch block in 14.8%, and PPM implantation in 7.9%. Table 1 compares these results with the randomized trials of SAVR versus TAVR in intermediate-risk patients,^{2,6,7} both of which have similar population characteristics to the current study.

The authors found that only severe stroke was associated with reduced 5-year survival. Greater-than-mild PVL was associated with reduced 2-year survival, but the difference did not persist at 5 years. In contrast, there was reduced 5-year survival in patients with greater-than-mild PVL in the Placement of Aortic Transcatheter Valves (PARTNER) 2 cohort. Given that PARTNER 2 was a larger trial (2032 patients) with a greater 5-year mortality, it may be that the current trial is underpowered to detect a significant association between PVL and 5-year survival.

Percy and colleagues are to be commended for their large, single-center series of patients with excellent perioperative and mid-term outcomes. They were able to explore the baseline characteristics and postoperative complications that were associated with poor survival in their real-world TAVR cohort composed mostly of high- and intermediate-risk patients. Mid- and long-term outcomes after TAVR are most critical for younger patients and those with low surgical risk, who represent only a small proportion of the patients included in this study. These patients are likely to have good long-term outcomes with

SAVR. For TAVR to be established as an acceptable alternative in low-risk patients, it must match long-term SAVR outcomes like valve durability, almost-absent rates of greater-than-mild PVL, and low PPM rates. The authors acknowledge that their results should be applied to younger, low-risk patients with caution. The most cautious approach, and perhaps the most reasonable, would be not to apply this study to low-risk candidates at all and instead to wait for long-term results from the PARTNER 3 trial and from future randomized-controlled trials focusing on low-risk patients.

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