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EDITORIAL COMMENT

Long-Term Survival After Surgical Aortic Valve Replacement

Expectations and Reality*

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In the United States, approximately 45,000 surgical aortic valve replacements (SAVR) are performed annually (1), with severe aortic valve stenosis (AS) being the leading indication for surgery. Without valve replacement, severe AS is a progressive, debilitating disease ultimately leading to death within a relatively well-defined time period (2). Life expectancy of patients with AS after invasive treatment can be compared with the life expectancy of medically treated patients or with a matched reference population to adequately inform patients and physicians before making decisions regarding treatment strategy.

Risk predicting scores in cardiac surgery, such as the Society of Thoracic Surgeons score or the EuroSCORE, are designed to forecast only short-term postprocedural morbidity or mortality and cannot be used to predict long-term survival. Although several studies analyzed and compared the observed and expected survival after SAVR (3-5), robust data on long-term life expectancy, especially in younger patients, remains scarce. Registries, reliably representing real-life practice with a massive number of patients and follow-up spanning over decades (6,7), can help elucidate this matter.

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In this issue of the *Journal*, Glaser et al. (8) provide important insights by comparing the long-term survival of 23,528 SAVR patients from the SWEDEHEART (Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies) registry with the survival of the general Swedish population, matched based on age, sex, and year of surgery. The authors analyzed the observed and expected survival and calculated the loss in life expectancy after SAVR in multiple subgroups according to patient age, sex, prosthesis type, and time period of surgery.

Similarly to previous studies, the authors found that SAVR can effectively "restore" life expectancy in elderly patients to an almost similar level of those not having severe AS (3-5). They found that the loss in life expectancy after SAVR was 0.4 years in patients age 80 years or older. In younger patients however, loss in life expectancy after SAVR was relatively high (4.4 and 3.8 years loss in patients age <50 years and age 50 to 59 years, respectively). This marked loss in life expectancy in younger SAVR patients compared with their healthy peers is thought-provoking and needs explanation.

Although comparing survival after SAVR with that of a matched general population is an elegant way to place the results in a proper perspective, the characteristics of the 2 groups might not necessarily be exactly similar. Differences in comorbidities can affect survival and thereby introduce bias to the analysis—as was correctly pointed out by the authors. For instance, a significant number of patients undergoing SAVR have concomitant coronary artery disease or associated valvular heart disease (7), which can adversely affect long-term survival.

However, prosthetic heart valves are associated with certain complications. Thromboembolism, structural valve deterioration, or prosthetic valve

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endocarditis are known to negatively influence survival after SAVR (9). Younger patients frequently receive a mechanical valve prosthesis, which necessitates lifelong anticoagulation. Theoretically, bleeding events associated with long-term anticoagulation could also contribute to impaired long-term survival, although, after correcting for the age at surgery, the authors did not find any differences between the loss in life expectancy of patients receiving mechanical or bioprosthetic valves.

Moreover, the etiology and morphology of AS are not uniform in all age groups. A study of 932 operatively excised stenotic aortic valves demonstrated that younger (age <60 years) patients predominantly have congenitally bicuspid or unicuspid valves, whereas in older patients (age >70 years) degenerative AS with tricuspid valves is more prevalent (10).

Can loss in life expectancy after SAVR be prevented? Besides efforts to avoid complications during follow-up, optimizing the timing of valve replacement can also improve life expectancy after SAVR. Severe AS results in progressive and irreversible myocardial fibrosis even in asymptomatic patients (11), which negatively affects long-term survival after valve replacement (12). In asymptomatic severe AS, however, current clinical practice guidelines recommend valve replacement only in case of very severe AS, worsening left ventricular function, or when elevated brain natriuretic peptide levels or abnormal exercise test results are present (13,14). Some of these patients develop myocardial fibrosis, which can be detected by cardiac magnetic resonance imaging. Performing valve replacement before this irreversible myocardial damage occurs could improve outcomes in these asymptomatic patients (15). This hypothesis is currently being investigated by a prospective, multicenter randomized trial (EVoLVeD [Early Valve Replacement Guided by Biomarkers of LV Decompensation in Asymptomatic Patients With Severe AS]; NCT03094143).

In summary, the loss in life expectancy after SAVR reported by Glaser et al. (8) can be considered substantial, and the reasons deserve further investigation. Optimizing the timing of intervention might be particularly important in younger patients with AS to minimize loss in life expectancy after aortic valve replacement.

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