FIGURE 1. Kaplan-Meier survival estimates of patients after transcatheter aortic valve insertion compared with an age- and sex-matched control population. TAVI, Transcatheter aortic valve implantation.

and sex-matched control population. Transcatheter valve replacement should not be denied to select patients.

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EDITORIAL COMMENTARY

Pushing the limits or the new normal? Transcatheter aortic valve replacement in nonagenarians

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See related article on pages 720-1.

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Disclosures: Authors have nothing to disclose with regard to commercial support. Received for publication May 28, 2015; accepted for publication June 3, 2015; available ahead of print July 3, 2015.

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J Thorac Cardiovasc Surg 2015;150:721-3

0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2015.06.008>

With a continuously aging population and an increased prevalence of severe aortic stenosis in the elderly, both surgeons and cardiologists are more frequently confronted with treatment decisions in a very complex patient population. By the year 2050, estimates indicate that the number of nonagenarians in the United States will increase from 2 to 8 million (Figure 1).¹ Advanced age is a key component in preoperative patient evaluation and risk estimation for patients undergoing surgical aortic valve replacement (SAVR). For patients aged >90 years in particular, surgical risk has been traditionally perceived as excessive, and many patients of this age were therefore not referred for SAVR by their physicians. Surgical

FIGURE 1. Increasing number of nonagenarians over time in the United States.¹

outcome data are limited at this extreme end of the age spectrum. However, some studies have shown very good outcomes in selected octogenarians² and nonagenarians,³ suggesting that advanced age alone does not determine a poor postoperative prognosis.

Recently, transcatheter aortic valve replacement (TAVR) has become available as an alternative treatment strategy in inoperable or high-risk SAVR patients.⁴⁻⁶ Although nearly every TAVR series published to date contains a subset of nonagenarian patients, surprisingly few studies have focused on this population. In the current issue of the *Journal*, Greason and colleagues⁷ report the outcomes of TAVR implantation in 46 nonagenarians from a single center. Despite a median age of 91.5 years, and a Society of Thoracic Surgeons (STS) predicted mortality risk of 8.5%, the authors found excellent short- and mid-term outcomes. The periprocedural mortality and stroke rates of 4.7% and 2.2% were certainly lower than predicted for this very elderly high-risk group. The only complication that occurred with frequency was vascular injury, which may be related to the high proportion of earlier-generation TAVR devices used. Such excellent results are in contrast to those in a previous report⁸ in which Corevalve (Medtronic, Minneapolis, Minn) implantation in 11 nonagenarians was associated with a 30-day mortality of 27.3%. However, the STS score in this latter patient cohort was very high, at 25.3%.

A recent report from the transcatheter valve therapy registry included 5276 patients in the age group 85 to 94 years, and 258 patients age ≥ 95 years undergoing TAVR in 299 TAVR sites.⁹ One-year mortality was 24.5% in patients

aged 85 to 94 years, compared with 31.4% for those aged ≥ 95 years. In contrast, Greason and colleagues⁷ report a substantially lower mortality rate of 15.4% at 1 and 2 years, which was comparable to age- and gender-matched controls from the general population.

The marked difference in outcomes between these 2 reports may be related to patient selection or operator expertise, among other factors. Regarding patient selection, the work by Greason and colleagues⁷ was performed in a large-volume quaternary referral center, and the number of nonagenarians denied TAVR therapy during the study period, was not stated. Furthermore, patients who cross multiple state boundaries to receive treatment (ie, 18% in the series from Greason and colleagues⁷) tend to be more mobile and less moribund than local referrals. Differences in operator expertise may also explain the observed differences in outcomes, as the transcatheter valve therapy registry included a number of low-volume centers and those that were early in their TAVR experience. Increased procedural volume may lead to not only increased operator expertise for technically challenging procedures,¹⁰ but also a better understanding of which patients are likely to do well with TAVR and which are not (ie, better patient selection).

The study by Greason and colleagues⁷ demonstrates that excellent outcomes can be achieved for TAVR, even in the very elderly. Improvements in TAVR technology may further improve patient outcomes. For example, recent results for a third-generation TAVR device presented at the American College of Cardiology revealed a 30-day mortality of only 1.1% in intermediate-risk, and 2.2% in

high-risk, patients.¹¹ If the STS predicted risk of mortality of a nonagenarian patient is elevated solely because of age, then procedural outcomes may be better than expected. On the other hand, nonagenarians with excessive frailty or other comorbidities that limit quality of life postprocedure should not be treated with TAVR.

Based on the data from Greason and colleagues,⁷ one can argue that TAVR should be the treatment of choice for properly selected nonagenarian patients with severe aortic stenosis. With a continuously increasing number of nonagenarians in the general population, TAVR may become “the new normal” and no longer be considered “pushing the limits” in this very elderly population.

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EDITORIAL COMMENTARY

Transcatheter aortic valve implantation in nonagenarians: Looking beyond survival

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See related article on pages 720-1.

As life expectancy increases in the developed world, the prevalence of severe symptomatic aortic stenosis (AS) in nonagenarians is following a similar trend. Transcatheter aortic valve implantation (TAVI) is a safe and effective treatment

for severe degenerative AS in patients with prohibitive or high surgical risk. However, only a few studies have reported on TAVI outcomes specifically in nonagenarians.¹⁻³

The paper by Greason and colleagues⁴ reports single-center TAVI outcomes in a nonagenarian patient population including 46 patients with a median age of 91.5 (range: 90-95) years. They demonstrate impressive, low treatment-related mortality (4.7%), and excellent 2-year survival (84.6% ± 10.6%). However, they additionally report a soberingly high complication rate, with about one half of patients suffering a complication, and more than one fifth incurring a vascular complication.

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Disclosures: Authors have nothing to disclose regarding commercial interests.

Received for publication June 13, 2015; accepted for publication June 15, 2015; available ahead of print July 22, 2015.

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J Thorac Cardiovasc Surg 2015;150:723-4

0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2015.06.026>