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EDITORIAL COMMENTARY

Two surgical techniques for transaortic transcatheter aortic valve replacement: Is there a preferred technique?

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See related article on pages 789-97.

In this issue of the *Journal*, Okuyama and colleagues¹ report an interesting study on alternative access routes in transcatheter aortic valve replacement (TAVR). They describe the results of transaortic TAVR achieved either through a partial J sternotomy (S-TAo) or through a right anterior thoracotomy (T-TAo). For comparison, they also present results of patients in whom TAVR was achieved by transapical access (TA) performed through a left lateral thoracotomy.

In terms of the operative outcomes of the study, the TA cohort had the shortest intensive care unit stay, whereas no other parameters displayed statistically significant differences. Interpretation of these findings, or lack thereof, however, should be undertaken with some caution. The numbers of patients in the transaortic groups (S-TAo, $n = 29$; T-TAo, $n = 22$) were quite low compared with

the TA group ($n = 86$). The TA approach had been practiced in the institution since 2008, whereas the transaortic technique was introduced in 2013, undoubtedly creating a discrepancy in operative experience. The patients in the intervention groups were not balanced in terms of preoperative characteristics (the TA group had significantly higher Society of Thoracic Surgeons predicted risk of mortality scores than did the S-TAo and T-TAo groups), and in this relatively small cohort 3 different balloon-expandable valve generations (Sapien, Sapien XT, and Sapien 3; Edwards Lifesciences, Irvine, Calif) were used.

The total absence of vascular complications in the transaortic (S-TAo and T-TAo) groups is to be commended and supports the existing consensus that alternatives to the TA approach may benefit from a reduced risk profile with respect to devastating vascular problems. Whether the potential benefits of the thoracotomy approach in transaortic TAVR are enough to encourage avoidance of a sternotomy, however, which is currently in use without issues in most institutions, including our own,² remains to be decided in larger prospective, randomized, and propensity-adjusted trials.

An intriguing aspect of this article is how Okuyama and colleagues¹ used preoperative computed tomographic scans retrospectively to assess annular entrance angles for each patient who had undergone operation by the transaortic method. By using the degree of entrance angle, Okuyama and colleagues¹ estimated the alignment of the TAVR valve and the aortic annulus and concluded that the T-TAo approach potentially provides for more coaxial valve placement, with greater likelihood of the distance between the access point and annulus conforming to existing recommendations. We hope that Okuyama and colleagues¹ are in the process of evaluating the validity of their findings by

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matching postimplantation valve profiles with the preoperative predictions.

Engineering efforts have established finite-element models of TAVR that have been used in patient-specific analyses of a wide variety of anatomies³; however, computational simulations are not yet routinely used in clinical practice. Surgical planning tools are emerging in the field of cardiac surgery, especially in the pediatric arena,⁴ and their use will very likely expand hand-in-hand with device and delivery system development. Working toward a clinical application for a modeling tool that uses the principles described by Okuyama and colleagues¹ would add to the armamentarium of TAVR planning by providing input into the optimal access route when a patient is eligible for more than one of the alternative access approaches. This

would be another milestone on the way to personalized, patient-specific health care.

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