Additionally, more frequent local vascular complications were observed in the TF group (18 patients; 4.5%) compared with the TC group (3 patients; 2.4%).

Despite all the positive aspects of the study, the main limitation of the Canadian experience⁵ was the lack of alternative approaches preferred in the non-TF cases. Potential drawbacks of carotid access are related to the interruption of the cerebral perfusion during valve implantation, risk of dislodging soft plaques leading to embolic strokes, presence of a small artery with the possibility of wall disruption or even the presence of contralateral carotid artery stenosis and cerebral arteriovenous malformation that may favor the occurrence of cerebral accidents. It would be interesting to compare the results of this approach with the surgical exposure of the left subclavian artery, which can be considered a second and safe alternative to TF-TAVR, considering also that there are a variety of factors to consider before an endovascular procedure, ranging from a patient's unique condition and anatomy to the skills of the team, the facility, and available technology. All of these factors needs consideration before TAVR implantation and therefore the possibility of

having only 2 options can become limiting or even dangerous.

We might answer our own question; that is, Is transcatheter access the best alternative for TAVR? by pointing out that the carotid artery is a good option for TAVR but, despite single-center experiences or larger multicenter trials, the selection of the optimal access route—including the femoral artery—should always be individualized to the patient.

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Commentary: Finding the best alternative for transfemoral transcatheter aortic valve replacement: Is it the transcatheter approach?

Ko Bando, MD, PhD

Ko Bando, MD, PhD

CENTRAL MESSAGE

Comparison of the transcatheter approach with other alternative approaches is needed to determine the best approach for patients who are not appropriate candidates for the transfemoral approach.

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Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication May 14, 2020; revisions received May 14, 2020; accepted for publication May 14, 2020; available ahead of print June 1, 2020.

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J Thorac Cardiovasc Surg 2022;163:79-81

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.05.058>

The majority of transcatheter aortic valve replacement (TAVR) procedures have been performed using a transfemoral (TF) approach. The safety and optimal outcomes of TF make it the most popular choice for patients regardless of their risk level for death with surgical aortic valve replacement.¹⁻⁴ Despite significant improvements in sheath size and delivery system, the TF approach is not used in up to 15% to 20% of candidates for TAVR due to patient-related factors such as unfeasible iliofemoral anatomy, significant descending aortic disease, and severe peripheral vascular disease.⁵ However, the best alternative approach has not been determined in patients who are not appropriate candidates for the TF approach.⁶

In this issue of the *Journal*, Junquera and colleagues⁷ compared the outcomes of transcarotid (TC) and TF TAVR. They found that, compared with the TF approach, the TC approach resulted in equivalent early mortality and major morbidity, including stroke, life-threatening bleeding, and major vascular complications. Moreover, survival and freedom from stroke/transient ischemic attack were similar between the TC and TF approaches up to 1 year after these procedures.

Many TAVR centers have used preferred alternative approaches when TF approach is not feasible, based on expertise and experience of their heart team. These include transapical (TA), transaortic (TAo), transaxillary (TAX), transcaval, and TC approaches. Since each approach has advantages and limitations, the technique should be chosen according to the patient's anatomy, comorbidities, and functional status.

Although TA and TAo were initially considered as the main non-TF approach, both require major surgical manipulation of the chest and are contraindicated by such as things as severe respiratory failure for TA, as well as porcelain aorta and previous cardiac surgery for the TAo approach. In fact, the TA and TAo approaches resulted in greater early mortality, major bleeding, and longer hospital stay compared with TF and TC approaches.^{8,9}

The TAX approach was developed because of disappointing outcomes associated with traditional TA- and TAo-TAVR. Recent Society of Thoracic Surgeons/American College of Cardiology Transcatheter Valve Therapy Registry data indicated that 30-day all-cause mortality, new-onset atrial fibrillation, and 30-day hospital readmission were significantly better with TAX than with TA/TAo.¹⁰ However, the greater stroke rate in the TAX group compared with the TF and TA/TAo groups is a major concern.^{10,11} As indicated by

the current study⁷ and others,^{5,9} the incidence of stroke with the TC approach is surprisingly low and equivalent to that of the TF approach^{7,9} and probably lower than that of the TAX.^{10,12}

The common carotid artery is large, allows for easy access, is usually free of atherosclerosis, and allows easy alignment with the aortic annulus. In contrast, the axillary/subclavian artery is close to the brachial plexus, may be atherosclerotic similar to the aortic arch, and has a steep subclavian to arch angulation and significant aortic root angulation.¹¹ On the basis of anatomical background and technical feasibility of each procedure, large-scale, prospective randomized studies, high-quality meta-analyses, and Society of Thoracic Surgeons/American College of Cardiology Transcatheter Valve Therapy registry data analyses of the alternative approaches for TF-TAVR should be performed to clarify candidate selection, operative mortality, and early/late outcomes among patients at high, intermediate, and low risk for death with surgical aortic valve replacement.⁵

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Commentary: When all roads lead to the heart—which one to choose?

Muralidhar Padala, PhD

The emergence of percutaneous approaches to correct valvular lesions, especially transcatheter aortic valve replacement (TAVR) to correct aortic stenosis, has kindled interest in using different vascular access sites to insert large-bore catheters and guide them to the aortic valve. Transapical and transfemoral access were introduced as the 2 access sites of choice in the early TAVR trials, with transfemoral access emerging as the safer option. Despite being standardized and becoming the first choice at all TAVR centers, transfemoral delivery is risky in patients with extensive atherosclerotic disease of the aorta or peripheral arteries, or a difficult aortic geometry, and requires alternative approaches. Transaortic, transcaval, trans-subclavian, and transcarotid access are alternate approaches reported in literature,¹⁻³ all with pros and cons, but none that seem to compare with transfemoral access.

In this issue of the *Journal*, Junquera and colleagues⁴ report prospective outcomes of transfemoral access (399 patients) and transcarotid access (127 patients) in patients undergoing TAVR with one of the several valves that are available commercially. Transfemoral access and delivery were performed using established techniques under local anesthesia. Transcarotid access was performed under general anesthesia, preferentially via the left common carotid

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Disclosures: Dr Padala received consulting fees and a research grant from Heart Repair Technologies, Inc, which did not have any role in this work.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication May 19, 2020; accepted for publication May 20, 2020; available ahead of print June 5, 2020.

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J Thorac Cardiovasc Surg 2022;163:81-2
0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2020.05.076>

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CENTRAL MESSAGE

Is transcarotid access comparable to transfemoral access for transcatheter aortic valve replacement?

artery, as coaxial alignment of the TAVR system with the aortic root was easier. Procedural duration and contrast volume were significantly lower in the transcarotid group, but procedural success rate and mortality were comparable between the 2 groups. Major vascular access-site complications occurred in 2.4% of the transcarotid access patients, compared to 4.5% of the transfemoral access patients. In the 3 patients with complications from transcarotid access, one developed an access-site hematoma that required draining, one required an interposition graft due to circumferential disruption of the vessel, and one required a bovine patch to repair the access site. At 30 days, neurologic stroke occurred in 2.4% of the transcarotid access patients and 3.3% of the transfemoral access patients, and the stroke was confirmed with imaging. Neither at 30 days nor 12 months were the outcomes or mortality different between the 2 access groups.

By reporting equivalent outcomes between the 2 approaches in a relatively small, but prospective trial, the authors establish the safety of transcarotid access for TAVR. The shorter path to the aortic valve from the carotid access site may reduce the engineering complexity of the delivery