Reality check in the minimally invasive world

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The world of aortic valve interventions is changing, and the pace is accelerating. The surgical options for treating aortic valve disease include repair increasingly, homograft and the Ross procedure less commonly than a couple decades ago, and a host of mechanical, porcine, bovine, equine, stented, stentless, and now sutureless aortic valves.¹ The surgical approaches include full sternotomy, partial sternotomy, transcatheter aortic valve replacement (TAVR), and right anterior minithoracotomy (RAMT) aortic valve replacement (AVR). The report in this issue of the *Journal* by Glauber and colleagues² provides insight into the use of RAMT in 593 (18%) of the 3313 patients undergoing AVR in their center during the past 10 years. Minimally invasive aortic valve surgery has evolved during the past 2 decades from some early use of RAMT-like approaches to a more standardized upper hemisternotomy.^{3,4} Reports are mixed, but single-center and meta-analysis reports indicate less bleeding, shorter times on the ventilator, and reduced intensive care unit and hospital stays.⁵ The price to be paid for that smaller incision comes as increased cardiopulmonary bypass, crossclamp, and operative times. “Publication bias” means that you tend to publish good results, not bad or average results, so this may play a role when interpreting the literature. For instance, at Northwestern about 70% of our isolated AVR operations are minimally invasive (usually upper hemisternotomy, although Dr Malaisrie does some RAMT procedures when the anatomy is favorable), but when we studied our results recently and propensity matched between minimally invasive and full sternotomy, we could find no clinically meaningful, financial, or statistically significant differences and therefore elected not to submit to a journal because we did not expect such an article would be accepted. We still do minimally invasive AVR in most cases, however, because it is safe, usually straightforward, and easily converted to full sternotomy if needed. RAMT, however is different; it is more of a tunnel down to the aortic valve, which is why patient selection on the basis of anatomic factors determined by preoperative computed tomographic scan (which is an unnecessary

Right anterior thoracotomy incision in the right third intercostal space (A) and surgical exposure (B). From Malaisrie SC, Barnhart GR, Farivar RS, Mehall J, Hummel B, Rodriguez E, et al. Current era minimally invasive aortic valve replacement: techniques and practice. *J Thorac Cardiovasc Surg*. 2014;147:6-14.

Central Message

Sutureless aortic valves facilitate the right anterior minithoracotomy approach, but the era of minimally invasive aortic valve replacement for aortic stenosis may slowly fade away.

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expense for hemisternotomy) is so important. In this report from the group in Massa, Italy, RAMT also led them to an evolution in technology, the use of sutureless aortic valves in almost 50% of patients. The patients with sutureless valves had shorter crossclamp and cardiopulmonary bypass times but were generally sicker so had more complications.²

Have we found the end of the road, and the future for isolated AVR is made up of RAMT with sutureless AVR? The cardiology literature serves as a reality check. The NOTION trial of TAVR versus surgical AVR looked at “all comers” older than 70 years (280 patients randomly allocated), with 30-day results very similar to this RAMT report.⁶ They concluded that in this patient group, much “less sick” than we are used to seeing with TAVR trials, that there was “no significant difference” between TAVR and surgical AVR for the primary end points of death, stroke, or myocardial infarction, and this is the headline and take home message for most readers in cardiology. The TAVR group, however, had a 34% need for permanent pacemakers, 16% moderate or severe paravalvular or valvular regurgitation at 1 year, and more dyspnea (29.5% vs 15.0% class II; $P = .01$). This is early in the evolution of TAVR technology, so those flaws can be reduced, but the message that TAVR outcomes today are still very different from those of surgical AVR in low-risk patients, those who typically undergo minimally invasive AVR, may be lost on many readers. For isolated aortic stenosis, the 20-year era of minimally invasive procedures that involve bypass, crossclamping, and a difficult surgical

approach may be soon fading away. The handwriting is on the wall, or in the journals in this case.

References

1. Malaisrie SC, McCarthy PM. Surgical approach to diseases of the aortic valve and the aortic root. In: Otto CM, Bonow RO, eds. *Valvular heart disease: a companion to Braunwald's heart disease*. 4th ed. Philadelphia: Saunders/Elsevier; 2013:199-218.
2. Glauber M, Gilmanov D, Farneti PA, Kallushi E, Micelli A, Chiaramonti F, et al. Right anterior minithoracotomy for aortic valve replacement: ten-year experience of a single center. *J Thorac Cardiovasc Surg*. 2015;150:548-56.e2.
3. Cosgrove DM III, Sabik JF. Minimally invasive approach for aortic valve operation. *Ann Thorac Surg*. 1996;62:596-7.
4. Gundry SR, Shattuck OH, Razzouk AJ, del Rio MJ, Sardari FF, Bailey LL. Facile minimally invasive cardiac surgery via ministernotomy. *Ann Thorac Surg*. 1998;65:1100-4.
5. Malaisrie SC, Barnhart GR, Farivar RS, Mehall J, Hummel B, Rodriguez E, et al. Current era minimally invasive aortic valve replacement: techniques and practice. *J Thorac Cardiovasc Surg*. 2014;147:6-14.
6. Thyregod HG, Steinbrüchel DA, Ihlemann N, Nissen H, Kjeldsen BJ, Petursson P, et al. Transcatheter versus surgical aortic valve replacement in patients with severe aortic valve stenosis: 1-year results from the All-Comers NOTION randomized clinical trial. *J Am Coll Cardiol*. 2015;65:2184-94.

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