is not always the main problem, and a trickier and more difficult gesture on the aortic leaflet is to be expected. A lesion of the left cusp is probably a sign of the need for more complex and less durable repair. Avoiding cusp reconstruction by means of pericardial patch will avoid early failure of the repair.

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Commentary: Repair of the tricuspid aortic valve: Simplicity is the ultimate sophistication

Stephanie L. Mick, MD, and
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In this edition of the *Journal*, Tamer and colleagues¹ analyzed the long-term outcomes associated with repair of a fairly infrequent aortic valve pathology, isolated tricuspid aortic valve (TAV) regurgitation (AR). While there are plentiful data showing favorable durability of repair for aortic valves with bicuspid morphology (bicuspid aortic valve [BAV]) and further, that circumferential annuloplasty techniques (ring or reimplantation) improve the stability of repair,²⁻⁸ similar data for TAV have been lacking.⁹

The authors aim to fill this gap in this single-center, retrospective analysis of 127 patients over 23 years who underwent aortic valve repair in the setting of TAV without aortic root or ascending aorta dilation (≥ 45 mm), connective tissue disease, endocarditis, or dissection. For the first decade in the experience, Cabrol annuloplasty sutures were employed for annular stabilization. After 2009, external ring annuloplasty was added to repairs in patients with normal root dimensions and valve reimplantation added when

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CENTRAL MESSAGE

Durability of repair of tricuspid aortic valve regurgitation may decline as overall complexity increases, and there is not yet sufficient evidence to establish the most effective annuloplasty type.

root diameter exceeded 40 mm. Cusp repair techniques included cusp plication, cusp resuspension, or pericardial patch repairs in the case of large/ruptured fenestrations, perforations, or retractions.

Cusp repair was performed in 117 (92%) and annuloplasty in 126 (99%). There were no in hospital mortalities, 10- and 14-year survival was $81 \pm 5\%$ and $71 \pm 6\%$, and freedom from reoperation was $80 \pm 5\%$ and $73 \pm 6\%$, respectively. Freedom from recurrent severe AR was $73 \pm 5\%$ and $66 \pm 7\%$ at 10 and 12 years. Cabrol annuloplasties made up a far larger proportion (73%) of this population than circumferential techniques (reimplantation or ring annuloplasties).

No difference in reoperation or AR recurrence was shown between annuloplasty techniques, which is different than in BAV, where circumferential techniques have been associated with improved durability.^{4,5,10} The authors do

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comment that in mixed-effects models, mean AR increased significantly more following Cabrol compared with circumferential annuloplasty, but the remaining analysis did not show a benefit. Perhaps more data will one day demonstrate a benefit for circumferential annuloplasty in TAV repair, but this work does not establish its superiority.

Independent predictors of recurrent severe AR included younger age, need for pericardial patch repair, and left ventricular end-diastolic diameter. Left coronary cusp repair was an independent predictor of reoperation. The authors speculate that left ventricular end-diastolic diameter, as a surrogate for AR severity and duration, thereby also acts as a marker for more severe valve lesions. Similarly, the authors attribute the association of left coronary cusp (LCC) repair and greater risk of reoperation to more severe or diffuse disease presentation when the LCC is involved. Along with need for patch repair as a predictor for recurrent severe AR, all of this taken together suggests that TAV repair durability is predominantly related to the severity of the cusp lesions at the time of repair. This is analogous to mitral valve repair, where broadly speaking, the durability of repairs of simpler lesions (eg, isolated posterior leaflet repairs) is superior to that of more complex lesions (eg, bileaflet pathology).¹¹⁻¹⁶

By its nature, TAV repair is more difficult than BAV repair due to the complexity of cusp coaptation. From this work, we can conclude that as additional layers of complexity are added (very long-standing AR with severe LV dilation, multiple cusp including LCC pathology, tissue defects that require patch repair), a lasting TAV repair is less likely regardless of which annuloplasty is added. This is important information that is useful for surgeons in procedural planning and for discussions of options with young patients who may be looking to avoid multiple procedures or lifelong anticoagulation.

Leonardo da Vinci was the first to describe in details the function of the aortic valve—it is no surprise that one of his favorite quotes (“simplicity is the ultimate sophistication”) perfectly applies to its repair.

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