

See Article page 109.



Commentary: Aortic regurgitation and aortic cusp repair: The devil is in the details

Ourania Preventza, MD, and Joseph S. Coselli, MD

Aortic valve repair techniques have evolved over the past few years. Techniques such as aortic cusp repair, annular and sinotubular junction stabilization, and aortic valve reimplantation have been shown to be safe and effective,^{1,2} and they avoid the potential drawbacks associated with aortic valve replacement.

The average severity of aortic regurgitation is increasing, and the frequency of the need for cusp repair is increasing with it.² In this issue of the *Journal*, Zhu and Woo³ provide an excellent and comprehensive review of cusp-repair techniques for bicuspid and tricuspid aortic valves. The authors describe a range of techniques from free margin plication to complex triangular resection with pericardial reconstruction, in which experience and expertise are key to achieving satisfactory results. The members of Dr Woo's team are experts with the various aortic valve repair techniques, and for surgeons who are beginning to develop their expertise, starting with a simple technique and progressing to a more complicated approach is advisable.

For tricuspid valves, there are various things to consider for aortic cusp and aortic valve repair to recreate a functional, accurate anatomic structure that will have long-term durability. The cusps need to be pliable, they should not prolapse, and their coaptation surface needs to be adequate. The first step, as the authors eloquently state,³ is enhancing the pliability and mobility of the cusps. Shaving off a modest amount of calcium can be acceptable, but there is a point at which replacing the valve may be the more durable option.

From the Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine; and Department of Cardiovascular Surgery, Texas Heart Institute, Houston, Tex.

Disclosures: The authors 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 Feb 12, 2021; revisions received Feb 12, 2021; accepted for publication Feb 22, 2021; available ahead of print Feb 27, 2021.

Address for reprints: Ourania Preventza, MD, Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, One Baylor Plaza, BCM 390, Houston, TX 77030 (E-mail: preventz@bcm.edu).

JTCVS Techniques 2021;7:119-20
2666-2507

Copyright © 2021 The Authors. Published by Elsevier Inc. on behalf of The American Association for Thoracic Surgery. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).
<https://doi.org/10.1016/j.xjtc.2021.02.040>



Ourania Preventza, MD, and Joseph S. Coselli, MD

CENTRAL MESSAGE

For aortic cusp repairs and valve implantation techniques, understanding both the aortic regurgitation's underlying mechanism and the aortic valve's anatomy is imperative for a durable result.

A redundant and prolapsed leaflet without noduli thickening may be repairable with central plication to achieve the perfect coaptation with the reference cusp. Resuspending the free margin is another way to achieve perfect coaptation and is particularly useful when small fenestrations exist. Repairing large fenestrations from degenerative valves is debatable because of the poor durability of the valve tissue. Pericardial patch reconstruction after leaflet resection has been described, but extensive repair never been shown to be preferable to a simple replacement. In addition, the location of the pericardial repair patch is important; a repair in the middle of the cusp may be more durable than a repair at the leading edge of the valve. Multiple cusp repairs and preoperative regurgitation can increase the risk of a nondurable repair.² For all these various techniques, experience is required to achieve excellent leaflet hemodynamics and a long-lasting functional aortic valve.

For patients with a connective tissue disorder and aortic regurgitation, the aortic root, the sinotubular junction, and the quality of the aortic cusps need to be taken into consideration for a durable repair. In these patients, significant aortic root dilatation in combination with severe aortic regurgitation and severely stretched, poor-quality cusps should be an indication to avoid a valve-sparing procedure and proceed with aortic root replacement.

For patients with a bicuspid aortic valve (BAV) whose cusps need to be repaired, cutting the raphe to release the "restricted" cusp and make it more conformable to restore

valve competency may be an option. Cusp repair, BAV cusp calcification, and fibrosis have been associated with valve failure.^{1,4} It is important to note, however, that for patients with BAV as well as patients with connective tissue disorders, someone could recreate an anatomically functional valve with excellent short-term results, but the substrate in these patients will lead to late failure. Experience and judgment are needed. Regardless of what technique is performed, understanding the underlying mechanism of the aortic regurgitation in combination with understanding the anatomy of the aortic valve would help with the decision-making process for a long-lasting result. The choice of technique should be specific to the patient and to that patient's anatomy.

The authors thank Stephen N. Palmer, PhD, ELS, of the Department of Scientific Publications at the Texas Heart Institute, for providing editorial support.

References

1. Schneider U, Hofmann C, Schöpe J, Niewald AK, Giebels C, Karliova I, et al. Long-term results of differentiated anatomic reconstruction of bicuspid aortic valves. *JAMA Cardiol.* 2020;5:1366-73.
2. Tamer S, Mastrobuoni S, Lemaire G, Jahanyar J, Navarra E, Poncelet A, et al. Two decades of valve-sparing root reimplantation in tricuspid aortic valve: impact of aortic regurgitation and cusp repair. *Eur J Cardiothorac Surg.* XXX, 2020 [Epub ahead of print].
3. Zhu Y, Woo YJ. Cusp repair techniques in bicuspid and tricuspid aortic valves. *J Thorac Cardiovasc Surg Tech.* 2021;7:109-16.
4. Patlolla SH, Schaff HV, Stulak JM, Michelena HI, Saran N, King KS, et al. Bicuspid aortic valve repair: causes of valve failure and long-term outcomes. *Ann Thorac Surg.* XXX, 2020 [Epub ahead of print].