Transaortic mitral valve surgery: Going down the rabbit hole again

Daniel G. Swistel, MD, and Eugene A. Grossi, MD

From the Department of Cardiothoracic Surgery, NYU-Langone Medical Center, New York, NY.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication June 28, 2017; accepted for publication July 10, 2017; available ahead of print Aug 14, 2017.

Address for reprints: Eugene A. Grossi, MD, Department of Cardiothoracic Surgery, NYU-Langone Medical Center, 530 First Ave, Suite 9V, New York, NY 10016 (E-mail: eugene.grossi@nyumc.org).

J Thorac Cardiovasc Surg 2017;154:1630-1

0022-5223/\$36.00

Copyright © 2017 by The American Association for Thoracic Surgery

<http://dx.doi.org/10.1016/j.jtcvs.2017.07.004>

Eugene A. Grossi, MD (left), and Daniel G. Swistel, MD (right)

Central Message

Transaortic repair of the mitral valve is a convenient, viable alternative to left atrial access. No matter the surgical indication, it is a tool we should have in our mitral armamentarium.

See Article page 1624.

In their article in this issue of the *Journal*, Choudhary and colleagues¹ report outcomes of transaortic edge-to-edge repair of modest functional mitral regurgitation as an adjunctive procedure during aortic valve replacement for severe insufficiency. The results demonstrate reduction of the functional mitral insufficiency, limited morbidity, and eventual reduction of the left ventricular dimensions, presumably from the elimination of aortic insufficiency. Their report provides us the opportunity to review the surgical history of this approach to the mitral valve.

Transaortic access to the mitral valve for replacement was reported in 1983 by Carmichael and colleagues² and subsequently by others.³ Recently, a transaortic approach for edge-to-edge repair has been reported by Mihos and associates^{4,5} in a cohort of 40 patients. The indication for repair was similarly functional mitral insufficiency in patients undergoing primarily aortic valve surgery. The reported late results have been gratifying. The authors emphasize the ease and convenience of access through the aortic root, both in visualization and shortening of the operating time, useful in these often complex cases. In addition, transaortic access to the mitral valve was also described by McIntosh and coworkers⁶ in 1992 as a frequent ancillary procedure for more complete resolution of outflow tract gradients in the surgical management of obstructive hypertrophic cardiomyopathy. A line of vertical plication sutures was designed to limit billowing of the anterior mitral leaflet into the outflow tract. A significant number of patients with obstructed hypertrophic cardiomyopathy may have relatively thin basal septal tissue, which limits the amount of muscular thickness that can be safely resected. Instead, these patients have redundant and elongated anterior and sometimes posterior mitral leaflets that are more contributory to the dynamic obstruction. With careful leaflet retraction of a well-functioning aortic valve, a variety of repair strategies on the mitral valve and supporting structures have been described.⁷ These techniques include horizontal plication, (improved leaflet shortening with preservation of the coaptation zone), residual leaflet

resection for the anterior leaflet (sometimes the posterior leaflet as well), and a variety of accessory chordal and papillary muscle manipulations for structural anomalies contributing to outflow tract obstruction. In fact, as the complexity of the pathophysiology of obstruction has become better defined, the need for these ancillary procedures, although not universal, has increased.⁸ Many of these repair techniques can only be performed through the aortic root. Left atrial access would require anterior leaflet discontinuity and reconstruction, a procedure that may lead to complications with time in this often younger patient population.

With relatively little practice and the proper retraction in the intact aortic valve, transaortic access to the mitral valve and subvalvular apparatus can become extremely convenient. In general, there is little trouble in retracting the anterior mitral leaflet to examine the posterior leaflet, even when the aortic root is relatively narrow. Transaortic repair of the mitral valve is a convenient, viable alternative to left atrial access and shortens operating time. No matter the indication, it is a tool we should have in our mitral armamentarium.

References

1. Choudhary SK, Abraham A, Bhoje A, Gharde P, Sahu M, Talwar S, et al. Transaortic edge-to-edge mitral valve repair for moderate secondary/functional mitral regurgitation in patients undergoing aortic root/valve intervention. *J Thorac Cardiovasc Surg*. 2017;154:1624-9.
2. Carmichael MJ, Cooley DA, Favor AS. Aortic and mitral valve replacement through a single transverse aortotomy: a useful approach in difficult mitral valve exposure. *Tex Heart Inst J*. 1983;10:415-9.
3. Frederick JR, Woo YJ. Transaortic mitral valve replacement. *Ann Thorac Surg*. 2012;94:302-4.

4. Mihos CG, Santana O, Brenes JC, Lamelas J. Outcomes of transaortic edge-to-edge repair of the mitral valve in patients undergoing minimally invasive aortic valve replacement. *J Thorac Cardiovasc Surg*. 2013;145:1412-3.
5. Mihos CG, Larrauri-Reyes Hung J, Santana O. Transaortic edge-to-edge repair for functional mitral regurgitation during aortic valve replacement: a 13-year experience. *Innovations (Phila)*. 2016;11:425-9.
6. McIntosh CL, Maron BJ, Cannon RO III, Klues HG. Initial results of combined anterior mitral leaflet plication and ventricular septal myotomy-myectomy for relief of left ventricular outflow tract obstruction in patients with hypertrophic cardiomyopathy. *Circulation*. 1992;86(5 Suppl):S1160-7.
7. Swistel DG, DeRose JJ Jr, Sherid MV. Management of patients with complex hypertrophic cardiomyopathy: resection/plication/release. *Oper Tech Thorac Cardiovasc Surg*. 2004;10:261-7.
8. Swistel DG, Balaram SK. Surgical myectomy for hypertrophic cardiomyopathy in the 21st Century, the evolution of the "RPR" repair: resection, plication, and release. *Prog Cardiovasc Dis*. 2012;54:498-502.