Letters to the Editor

The Editor welcomes submissions for possible publication in the Letters to the Editor section that consist of commentary on an article published in the Journal or other relevant issues. Authors should:

- Include no more than 500 words of text, three authors, and five references
- Type with double-spacing
- See <http://jtcvs.ctsnetjournals.org/misc/ifa.htm> for detailed submission instructions.
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Letters commenting on an article published in the JTCVS will be considered if they are received within 6 weeks of the time the article was published. Authors of the article being commented on will be given an opportunity to offer a timely response (2 weeks) to the letter. Authors of letters will be notified that the letter has been received. Unpublished letters cannot be returned.

Tubular heart valves

To the Editor:

Cox and associates¹ recently presented in vitro testing results on the 3F Aortic Bioprosthesis. Unfortunately, Cox and colleagues chose not to give authorship to any of the engineers who performed this work, nor even give them the courtesy of an acknowledgment. Due to the lack of input from these engineers, of whom I am one, the article contains several technical and interpretive errors that should be corrected. They are as follows:

- The text gives the impression that a laser micrometer was used to measure aortic chamber compliance during flow testing. Those measurements were actually made on valveless chambers in a separate test system before flow testing.
- The paper states, "Five milliliters of corn starch was . . . injected into the flow loop to act as an acoustic scattering agent." This is nonsensical since laser-based flow visualization does not employ acoustic scatter in any way. The statement refers to a technique used during in vitro Doppler studies and is presumably a "copy and paste" error.
- Wear testing of the valve was not conducted at 700 to 900 Hz as implied. The test rate was 700 to 900 rpm, which is about 12 to 15 Hz.
- Wear testing was not conducted on valve sizes 19-, 21-, 23-, 25-, and 27-mm valves, 2 of each size, as stated. Testing was conducted on 19-, 25-, and 29-mm valves, 10 of each size.
- The authors state, "This nonturbulent flow was characteristic of . . . all valve sizes . . ." Since flow visualization testing was only conducted on 19-mm valves, this is conjecture being stated as fact.
- The authors state, "The distribution of stress on the leaflets of the 3F Aortic Bioprosthesis shows the greatest degree of stress to be in the belly of the

valve leaflets, with less stress at the commissural posts (Figure 6)." This statement is actually in direct contradiction to Figure 6. The figure clearly shows the largest stresses to be along the leaflet edge and at the commissural attachment point.

These corrections are not intended to be petty or esoteric. As the clinical use of the 3F aortic valve continues to grow, it is important to have accurate literature reports of how the valve has been tested, as well as sound technical analyses of its performance features. Rather than relying on ill-conceived theories of "tubular" geometry or "form follows function," the valve's excellent performance can be attributed to more straightforward design features (ie, the leaflet design, the small, unobstructive sewing ring, the lack of rigid supports structures, and the mechanical durability of pericardium). An intellectually and scientifically rigorous paper with a description of these features and how they translate to the observed performance would have been much more useful.

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Reference

1. Cox JL, Ad N, Myers K, Gharib M, Quijano RC. Tubular heart valves: a new tissue prosthesis design—preclinical evaluation of the 3F aortic bioprosthesis. *J Thorac Cardiovasc Surg.* 2005;130:520-7.
doi:10.1016/j.jtcvs.2005.08.038

Effectively treating ischemic mitral regurgitation with chordal cutting in combination with ring annuloplasty and a left ventricular reshaping approach

To the Editor:

I read with great interest the case reported by Yamamoto and colleagues¹ in the August 2005 issue of the *Journal*. In the article the authors presented a patient in whom they repaired chronic ischemic mitral re-

gurgitation (IMR) by cutting the strut chordae of the anterior mitral leaflet, and they combined this approach with ring annuloplasty and left ventricular volume reduction surgery. The technique reported by Yamamoto and colleagues is an effective modality, but there are some concerns that should be clarified. As stated previously, IMR is a ventricular disease and not a valvular disease. Although the tethering of the mitral leaflet might play role in the development of chronic IMR, it is not the cause but rather the result of a pathophysiologic process. Chordal cutting increases leaflet coaptation area by abolishing the bending of the anterior mitral leaflet, but it does not address all underlying mechanisms of functional IMR. We also know that the underlying cause of chronic IMR might differ between individual patients. Because the underlying mechanism might differ between patient groups, the chordal cutting technique might not have the same effectiveness in all patients.

Lastly, I think that there was also a misinterpretation of the successful result. The authors used the combination of 3 different techniques, which addressed all the underlying mechanisms, but only emphasized the importance of chordal cutting. I believe that the successful result of this surgical intervention could not be attributed to only the chordal cutting procedure. Therefore the authors should comment on how they draw such a result from the data presented. Additionally, instead of chordal cutting, I also believe that the main factor for the disappearance of leaflet restriction is the left ventricular volume reduction surgery, which decreases the interpapillary distance.

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Reference

1. Yamamoto H, Iguro Y, Sakata R, Arata K, Yotsumoto G. Effectively treating ischemic mitral regurgitation with chordal cutting in combination with ring annuloplasty and left ventricular reshaping approach. *J Thorac Cardiovasc Surg.* 2005;130:589-90.
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Reply to the Editor:

We thank Dr Basaran for raising important questions concerning our report of chordal cutting in combination with ring annuloplasty and overlapping cardiac volume reduction (OLCVR) operation, which is a new clinical therapeutic approach for the treatment of ischemic mitral regurgitation (IMR).

We think that IMR associated with myocardial infarction and ischemic cardiomyopathy is a progressive disease. There is a possibility of recurrence of IMR after the operation because of the persistent left ventricular (LV) remodeling. Therefore we paid attention to not only a disappearance of mitral regurgitation immediately after the operation but also to the long-term prevention of IMR recurrence after surgical intervention.

We also think that LV plasty should be able to not only reduce the LV volume but also to correct the displaced papillary muscles (PMs), and such LV plasty will thus contribute greatly to reducing mitral tethering.

In some cases of IMR, chordal cutting is a possible additional technique, depending on the patterns of chordal attachment, and this technique will surely increase the coaptation of the mitral leaflets in comparison with LV plasty alone. In addition, we expect this technique will also help to prevent postoperative IMR recurrence.

The current surgical approach for IMR mainly focuses on annular size reduction with an annuloplasty ring, which is usually effective. However, mitral annuloplasty (MAP) is not a fundamental therapy for IMR. Zhu and colleagues¹ reported that MAP causing anterior displacement of posterior mitral annulus augments the tethering of posterior mitral annulus with an impaired mobility and coaptation, and this mechanism is also related to persistent IMR after MAP. Therefore additional mitral valve plasty will be necessary to reduce such tethering.

Several methods related to the reduction of the tethering of IMR have been reported. Two approaches have been considered. The first is to correct the displaced PMs, and the second is to perform chordal cutting. The reduction of the distance between PMs by using PM imbrication and PM sling and the reduction of the distance between the mitral annulus and PMs by relocating the posterior PM and LV plication can lead to a decrease in the degree of tethering and the disappearance of MR. The chordal cutting method, which cuts tethered

strut chordae, is a direct correction of the tethering. However, whether chordal cutting is possible depends on the attachment of strut chordae to the anterior mitral leaflet. Only in cases in which the bifurcated strut chordae are attached to the leaflet edge and the marginal portion between the rough and clear zone can chordal cutting spare the chorda attached to the leaflet edge.

In this case, with severely dilated and dysfunctional LV after anterior myocardial infarction, we thought it necessary to reduce the LV volume for end-stage ischemic cardiomyopathy. The OLCVR operation is thus considered to be an effective procedure to correct the displaced PM dimensions, but there is a risk that an LV volume reduction sufficient to correct the PM displacement might result in too small of an LV volume. Matsui and coworkers² reported OLCVR with PM plication to enhance the remodeling effect of the ventricle.

We used 3 techniques to treat IMR in this case. We also think that MAP and LV plasty (OLCVR) contributed to our successful results and that chordal cutting can therefore reinforce mitral coaptation. We hope that IMR recurrence can thus be prevented long term after surgical intervention by means of such a strategy.

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2. Matsui Y, Fukada Y, Naito Y, Sasaki S. Integrated overlapping ventriculoplasty combined with papillary muscle plication for severely dilated heart failure. *J Thorac Cardiovasc Surg.* 2004;127:1221-3.
doi:10.1016/j.jtcvs.2006.01.034

Residual strain in the aorta To the Editor:

We were excited to see yet another seminal contribution to the literature on aortic aneurysmal disease arising from the labora-