See Article page 607.

Commentary: Following the game-changers: Are we on the right track now?

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CENTRAL MESSAGE

Repair as *the* principle is not inappropriate for treating ischemic mitral regurgitation, despite restrictive annuloplasty may not always be a winner. The real issue is, we must do the right repair for the right patient.

Over the past few years, there have been many heated discussions about selecting the appropriate surgical strategy for ischemic mitral regurgitation (IMR) during coronary artery bypass grafting procedures. The initial results of the Cardiothoracic Surgical Trials Network (CTSN) multicenter randomized investigations on severe and moderate IMR were published in January and December 2014, respectively.^{1,2} Their subsequent 2-year follow-up findings were reported in 2016, again in the *New England Journal of Medicine*.^{3,4} These 4 articles generated intense debate among the cardiac surgical community worldwide and eventually became authentic game-changers. In 2017, the American Heart Association/American College of Cardiology guidelines were modified accordingly.⁵ For severe IMR, replacement of the mitral valve with a chordal-sparing technique was considered more reliable than downsized annuloplasty; for moderate IMR, simply leaving it alone is no longer considered a bad choice, because “the usefulness of mitral valve repair is uncertain.”⁵ To some surgeons, the decision making process appears easier today. However, in terms of clinical outcomes, whether we are making any substantial progress by implementing such a “simplified” surgical policy remains uncertain.

To address this question, Nappi and colleagues⁶ have conducted a timely meta-analysis. Along with analyzing the available surgical trials, their comprehensive systematic

review also covers several important aspects, including rapidly-evolving transcatheter therapy—namely, the MitraClip intervention—and the latest clinical evidence on guideline-directed medical therapy. The former was highlighted by 2 recent multicenter randomized trials: the Percutaneous Repair with the MitraClip Device for Severe Functional/Secondary Mitral Regurgitation (MITRA-FR)⁷ and Cardiovascular Outcomes Assessment of the MitraClip Percutaneous Therapy for Heart Failure Patients with Functional Mitral Regurgitation (COAPT)⁸ studies. Even though neither trial included a surgical arm for a broader comparison, they are arguably considered by many to be game-changers as well. Such updated information is definitely noteworthy; however, in this brief commentary, we focus only on 2 fundamental surgical issues—selecting the right patients and applying the right techniques.

The first issue relates to patient selection. Few would disagree that it is illogical to choose replacement strategy over repair in the setting of IMR. IMR is a ventricular problem, not a valvular problem. The mitral valve is basically normal, which is why IMR is classified as “functional.” It makes little sense to routinely replace a normal valve with an artificial prosthesis.

So what have we truly learned from the 2 important CTSN trials? On the one hand, we recognize that patients who had severe IMR following successful downsized annuloplasty (ie, without recurrence of MR) had the best

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FIGURE 1. Anterior mitral valve leaflet patch augmentation with true-sized annuloplasty. A, After the true-size annular measurement according to the usual principle (ie, based on the size of the anterior leaflet and on the intertrigonal distance), an incision is made along the anterior mitral annulus (the *dashed line*). B and C, A CardioCel (LeMaitre Vascular, Burlington, Mass) patch slightly larger than the space area succeeding the “fall” of the anterior mitral leaflet is prepared and sutured on the leaflet, followed by a true-sized semirigid ring annuloplasty. D, Systolic anterior motion is never a concern, as the patch-augmented anterior mitral valve leaflet is always “pushed” toward the left atrium during the systolic phase.

clinical outcomes.^{1,3,6} The well-proven principle “good repair is always better than good replacement” remains valid. Thus, restrictive annuloplasty as a useful tool could still be applied in some carefully selected patients. On the other hand, the disappointing high incidence of MR recurrence—58.8% at a 2-year postoperative follow-up in the CTSN severe IMR trial³—reflects the failure of restrictive annuloplasty in another subgroup of patients. Nonetheless, it does not instinctively indicate the overall “failure of mitral valve repair.” The challenge facing us now is to reliably identify this specific patient subgroup (in whom restrictive annuloplasty may not work) before surgical intervention. In fact, the CTSN investigators⁹ recently discovered a crucial criterion: left ventricular (LV) size. They showed that the mismatch between LV size and mitral ring size is an independent predictor of recurrent MR after restrictive annuloplasty.⁹ In other words, downsized annuloplasty is likely to fail in patients with severe IMR who have a significantly enlarged LV.

Equally important is the second issue that relates to the surgical strategy. A revolutionary concept modification is to apply true-sized annuloplasty in cases with enlarged LV (which resulted from the adverse remodeling secondary to myocardial infarction). For instance, in terms of preventing postoperative recurrent MR, a mitral annuloplasty ring size of 32 mm would be better than 26 mm if the LV end-systolic dimension was 52 mm.⁹ Regarding the ring choice, we now prefer to use complete (rather than C-shaped band), semirigid (rather than rigid) rings in the IMR setting.¹⁰ As the primary goal of the mitral valve repair is to restore an optimal surface of coaptation, some additional repair techniques besides the annuloplasty are definitely needed. Nappi and colleagues summarize the possible contributions of the subannular repair techniques. Over the past few years, we have chosen to perform anterior mitral valve leaflet patch augmentation plus true-sized

annuloplasty (Figure 1) and have observed satisfactory short- and mid-term clinical results.

In summary, we strongly believe that compared with mitral valve replacement or MitraClip intervention in the setting of moderate to severe IMR, mitral valve repair using appropriate surgical strategy and guideline-directed medical therapy can further improve the clinical outcomes in carefully selected patients. Future multicenter randomized evaluations are warranted when we truly do what is right, not what is easy or popular.

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