Toward a better repair for ischemic mitral regurgitation: Thinking outside the ring

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Restrictive annuloplasty has been a standard surgical therapy for ischemic (functional) mitral regurgitation (IMR), yet the mechanism of IMR is a subvalvular problem with derangement of the papillary muscles apparatus due to ventricular dilation from coronary artery disease or cardiomyopathy (Figure 1).

Obase and colleagues¹ report a case series of 9 patients who underwent the “3R” repair for functional mitral regurgitation (MR) consisting of anterior leaflet augmentation with pericardial patch, papillary muscle suspension, and ring annuloplasty. Compared with historical controls of 11 patients who underwent ring annuloplasty alone, the authors report that the 3R repair resulted in no recurrence rate of greater-than-mild MR to date, whereas the ring annuloplasty-alone group had a 56% recurrence rate of greater-than-mild MR at 5 years.

This report by Obase and colleagues¹ highlights an active area of interest in cardiac surgery—toward a better repair for IMR. The Cardiothoracic Surgical Trials Network (CTSN) trial on severe ischemic mitral regurgitation,² which was a randomized, multicenter trial in which the investigators compared mitral valve replacement versus mitral valve repair

Potential therapeutic targets other than annulus for mitral ischemic mitral regurgitation.

Central Message

There is need for better repair options for ischemic mitral regurgitation. Obase and colleagues report on a case series combining papillary muscle suspension and leaflet augmentation with ring annuloplasty.

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FIGURE 1. Potential therapeutic targets other than annulus for mitral ischemic mitral regurgitation. LV, Left ventricle; MR, mitral regurgitation; Ao, aorta.

with restrictive annuloplasty, showed that there was no difference in the primary outcome of left ventricular end-systolic volume index (LV ESVi) between the 2 groups. Furthermore, the repair group had a significant increase in recurrence rate of moderate or greater IMR at 2 years (59% vs 4%). When the repair group was subcategorized by presence of recurrent moderate or greater MR, patients without recurrent IMR had significantly greater LV reverse remodeling (LV ESVi = 43 mL/m² vs 63 mL/m²), which also was greater than the mitral valve-replacement group (LV ESVi = 61 mL/m²). What this implies is that we need a better, more durable mitral valve repair for IMR than simply restrictive annuloplasty. Kron and colleagues³ showed that the mechanism underlying recurrence of IMR in the CTSN severe IMR trial was persistence of leaflet tethering, which was not addressed with ring annuloplasty. The presence of an inferobasal aneurysm or dyskinesia was found to be a predictor of recurrent IMR in this patient population.

Operations that address the subvalvular region or leaflet augmentation to relieve leaflet tethering have been reported previously, mostly in small case series.^{4,5} Small, randomized, single-center studies have been performed for chordal cutting and papillary muscle approximation with encouraging results, demonstrating greater long-term reduction in MR with the addition of subvalvular approaches to ring annuloplasty.^{6,7} This case series by Obase and colleagues¹ combined both leaflet augmentation

and subvalvular IMR repair. What we don't know is which patients will benefit from ring annuloplasty versus subvalvular manipulation versus leaflet augmentation or a combination. There is a need for larger-scale, multicenter randomized studies to test efficacy of subvalvular and leaflet augmentation approaches to treating IMR. At a minimum, registry data would be highly valuable. Patients with IMR have a poor prognosis. The time is now to "think outside the ring" by continued innovation to provide more and better therapeutic options.

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