Fibbin' under pressure

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Central Message

Increased valvular gradients after mitral valve repair for degenerative disease may lead to higher incidence of late-onset atrial fibrillation.

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Mitral valve repair for degenerative mitral regurgitation has been firmly established as the surgical criterion standard of care.¹ Although valvular competence and repair durability have traditionally represented the focus of clinical follow-up, freedom from atrial fibrillation may be of significance for quality of life and avoidance of morbidity. In the current issue of the *Journal*, Ma and colleagues² analyzed 390 patients undergoing degenerative mitral valve repair for development of early and late postoperative atrial fibrillation. These investigators found that onset of atrial fibrillation beyond 6 months after surgery was associated with an increased transmitral gradient, which in turn was independently predicted by leaflet cleft closure, the edge-to-edge repair technique, complete ring annuloplasty, and lower indexed prosthesis size. Postoperative mitral gradient of 4.5 mm Hg or greater, seen in 13.3% of the study population, was found to be a cutoff predictor of atrial fibrillation, with 28% and 0.6% of patients above and below this threshold, respectively, having the complication develop. It is not unreasonable to expect that increased valvular gradients result in atrial remodeling and electrical irritability, and these data underscore the distant effects of technical subtleties of mitral repair that may not directly affect repair durability yet still have clinical significance.

Undersized annuloplasty for ischemic mitral regurgitation has been recognized to induce functional stenosis,³ but in degenerative disease, where annular prosthesis true sizing represents the clinical norm, pathogenesis of excessive transmitral gradients after valve repair has not been studied in detail. A recent Japanese study⁴ of 602 patients with degenerative mitral disease found that a postoperative mitral gradient of at least 5 mm Hg was associated with a significantly higher 10-year rate of development of atrial fibrillation, with annuloplasty size representing the sole predictor of mitral stenosis. These data corroborate the timely report presented by Ma and colleagues² and should give pause to surgeons performing these procedures. Implantation of a band versus ring annuloplasty may better preserve valve orifice area and annular plasticity and optimize anterior leaflet mechanics to reduce restriction to diastolic left

ventricular filling.^{5,6} Prosthesis flexibility may be of further aid in maintaining more physiologically accurate annular motion. Aggressive resection techniques, especially in the presence of fibroelastic deficiency, may leave inadequate leaflet tissue to achieve valvular competence without a “tight” annuloplasty, lending renewed pertinence to the “resect versus respect”⁷ debate of mitral repair. Although the mitral valve is invariably transformed into a monoleaflet valve after prosthetic annuloplasty, attempts to reduce the posterior leaflet to a mere door stop through cleft approximation may not be inconsequential. The Alfieri edge-to-edge repair is often used as a bail-out technique when the performed repair is suboptimal, yet it may increase valvular gradients further, depending on the length and location of leaflet approximation.⁸ It is reasonable to conjecture that the onset of atrial fibrillation further increases mitral gradients as a result of the absence of atrioventricular synchrony, thus begetting continued structural and electrical remodeling of the left atrium. Such patients may be more prone to the development of clinically significant mitral stenosis and long-term need for reoperation, even in the setting of maintained valvular competence.

The study of Ma and colleagues² alerts the surgical community that even with successful restoration of valvular competence, the technical nuances of mitral repair for degenerative disease may lead to distant morbidity, such as atrial fibrillation, if the postrepair valvular gradient is elevated. These findings challenge the surgeon to pursue more physiologically accurate repair techniques that best reestablish the native dynamic geometry of the mitral

valve to abolish mitral insufficiency yet avoid functional stenosis.

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