Commentary: Escape valve for the pressures of life

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Central Message

Mitral regurgitation adversely influences chamber remodeling in the setting left ventricular infarction.

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Ischemic mitral regurgitation (IMR) continues to be a clinical enigma with suboptimal surgical results[1] and poor long-term outcomes.[2] The interplay between myocardial infarction, ventricular remodeling, and valvular incompetence has been studied extensively, yet no clear picture emerges as to whether mitral insufficiency is an underlying cause or a marker of ventricular remodeling and poor prognosis. Previous studies in sheep have suggested that elimination of IMR does not alter ventricular remodeling,[3] yet timing of intervention might be of critical importance.[4,5] In this issue of *The Journal of Thoracic and Cardiovascular Surgery*, Onohara and colleagues[6] present a rodent model of structural mitral regurgitation (MR) and myocardial infarction to study the effect of each intervention in isolation and their additive effect on chamber remodeling and myocardial function. This is an elegant study with advanced imaging and invasive monitoring techniques that are not easily achieved in small animals. The authors report that severe structural MR when induced in the setting of anterior left ventricular ischemia results in greater chamber remodeling then either isolated infarction or valvular insufficiency. These results suggest that elimination of mitral insufficiency in ischemic ventricles might favorably affect chamber remodeling and myocardial function, but extrapolation of these data to the surgical treatment of ischemic MR should be made with caution.

An analogous model of controlled leaflet perforation in sheep[7] similarly revealed significant end systolic and end diastolic volume increase 12 weeks after induction of MR, confirming the authors' findings in a large animal model. The observed chamber remodeling with this form of structural MR was reported to be associated with abnormal torsional dynamics[8] and altered transmural myocardial strain.[9] IMR, however, develops over time after an initial posterolateral myocardial infarction which is not immediately associated with significant valvular insufficiency.[10] In the current study, the authors induced left ventricular ischemia and concurrent severe structural MR, potentiating their effect on chamber remodeling to a degree that might not be seen clinically. Although the authors elegantly demonstrate the additive effect of ischemia and MR on left ventricular function and remodeling, the evolution of ischemic MR is more complex than the sum of its individual parts. In clinical studies, when left ventricular end diastolic diameter reaches 65 mm correction of severe IMR[11] does not improve clinical outcomes suggesting the "horse is out of the barn," and earlier intervention should be considered. However, surgical treatment of less than severe MR at the time of concurrent coronary artery bypass grafting has not been shown to affect chamber remodeling or mortality in the short term.[12] Recent analysis of randomized trials of percutaneous treatment of IMR has implicated the equilibrium between degree of valvular insufficiency and chamber remodeling as a guide for effective surgical therapy of IMR.[13] The presented experimental data add scientific scaffolds to these emerging concepts and such rigorous efforts will pave the path to effective surgical therapy. Whether the mitral insufficiency is an integral component of the pathophysiology of postinfarct chamber remodeling or a "pop-off" valve for the distressed left ventricle remains to determined.

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