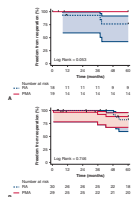


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THE USE OF SUBVALVULAR REPAIR FOR ISCHEMIC MITRAL REGURGITATION: IS IT FINALLY COMING OF AGE?



To the Editor:

We congratulate Xu and colleagues¹ on this excellent experimental work on the mechanical effect of restrictive annuloplasty (RMA) and subvalvular apparatus surgery in ischemic mitral regurgitation (IMR).¹ The authors reinforced and substantiated with experimental evidence concepts expressed in biomechanical models^{2,3} and that also emerged from previous retrospective studies in IMR⁴⁻⁷ and the major randomized trials, as the Papillary Muscle Approximation (PMA) trial^{8,9} and CTSNet trial.¹⁰ Undersizing RMA could lead to impairment of ventricular mechanics and torsion by deforming the mitral annulus. The perturbation of ventricular geometry and torsion dynamics could inhibit reverse remodeling achieved after mitral regurgitation correction. Conversely, subvalvular surgery with PMA is able to achieve mitral regurgitation competency without a significant distortion of left ventricular (LV) geometry, and this effect could ensure positive remodeling over time after repair.¹

When translating these results in the clinical practice, important considerations should be made. First, the parameters of distortion of the mitral valve and measure of LV dimensions in the individual patient should also be taken into

account. In the most extreme conditions of altered distortion of mitral valve and left ventricle (LV end-diastolic diameter ≥ 60 , LV end-systolic diameter ≥ 50 ; coaptation length ≥ 12 , α^2 angle $\geq 45^\circ$, interpapillary muscle distance > 20 mm), RMA can only worsen LV mechanics, and, in very dilated ventricles, the drastic reduction of the anteroposterior annular diameter in absence of a positive ventricular remodeling might result in an imbalance between the action applied by the annular restriction and the pulling forces exerted in dilated left chamber.²⁻⁴

Second, the effectiveness and safety of the use of subvalvular repair has its limits due to the fact that LV function and mechanics are not always recoverable. In fact, in a patient with severe and proportionate IMR, PMA surgery may not directly improve the prognosis, as shown by the rate of rehospitalization for heart failure and data on ventricular dimensions and remodeling at 5 years' follow-up in the PMA trial. PMA was not found to be a significant effect modifier in 17% of patients with anterior myocardial infarctions and symmetrical patterns with predominant severe lateral tethering.^{8,9,11} Finally, myocardial revascularization with coronary artery bypass grafting was shown to be critical to ensure positive LV remodeling and improve clinical outcomes.^{8,9}

Despite the encouraging results in this experimental study and the acceptable outcomes in clinical trials, still greater than 20% of patients experience complications in the long term as rehospitalization for heart failure and progression of negative LV remodeling after PMA. The reasons underlying these adverse results can be partially explained by the fact that the clinical benefit of additional PMA is multifactorial. Although surgery of papillary muscles may seem appropriate in patients with dilated left ventricles with large areas of scarring, dyskinesia, or a basal aneurysm, prospective trials on the use of subvalvular surgery of mitral valve are currently insufficient to demonstrate improvements in postoperative tethering in patients with LV lateral wall dysfunction, persistent LV dyskinesia, severe alteration of LV sphericity, as well as predominant lateral displacement of both leaflets due to symmetric tethering.

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