MV repair with papillary muscle manipulation to correct leaflet tethering may be the optimal approach to restore valve competence, improve the degree of ventricular reverse remodeling, and reduce the likelihood of MR recurrence.⁶ Thankfully, the credits are not yet ready to roll on the ischemic MR story, which provides us with plenty of time to continue debating how best to manage this heterogeneous spectrum of disease.

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Commentary: Ischemic mitral regurgitation: From annular restriction to papillary approximation, is it time to reconsider the lost technique?

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The undersizing annuloplasty popularized by Bolling and colleagues¹ for ischemic mitral regurgitation is criticized for being an annular solution to a ventricular problem with significant regurgitation recurrence.²⁻⁴ This was confirmed in a randomized trial comparing repair and replacement.⁵ A ventricular repair for ischemic mitral regurgitation was first reported by Kron and colleagues⁶ with posterior papillary muscle relocation, but it was Hvass and colleagues⁷ who proposed the papillary muscle sling.

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CENTRAL MESSAGE

The lost technique of papillary muscle approximation provides superior outcomes compared with restrictive annuloplasty in ischemic mitral valve repairs.

Animal studies have shown undersizing annuloplasty does not improve ventricular volumes or positively influence remodeling.^{8,9} Papillary muscle approximation (PMA), although not widely adopted, has favorable results in reducing regurgitation and improving ventricular volumes, ejection fraction, and ventricular remodeling at short- and long-term follow-up.^{10,11}

Xu and colleagues¹² present data from their ischemic mitral regurgitation swine model study comparing undersizing mitral annuloplasty (UMA) with PMA. Fifteen swine had an induced inferolateral infarction by occlusion of

obtuse marginal branches using alcohol. Animals were confirmed to have 2+ mitral regurgitation of ischemic nature at 2 months. Nine animals underwent UMA and 6 underwent PMA. Three months after surgery, cardiac magnetic resonance imaging was performed to assess ventricular mechanics. The authors reported no difference in mitral regurgitation postprocedure. In the UMA group, the septal-lateral diameter decreased from 31.68 to 23.91 with the ring implantation, whereas there was no significant difference in the PMA group. Wall thickening was lower in the UMA group, especially in the equatorial septal and apical segments compared with the PMA group. The UMA group had reduced systolic radial velocities at all segments in the base; at the equatorial levels in the anterior and posterior regions; and in the apex the septal, lateral regions. Diastolic relaxation was restricted in the UMA group with a higher influence at the basal and equatorial levels. The left ventricle twist and torsion was lower in the UMA group. The authors conclude that UMA can be unphysiological and can impair ventricular mechanics and torsion.

This elegantly designed and well-executed swine model study by Xu and colleagues¹² offers a window into the negative effects on ventricular remodeling of undersizing annuloplasty in ischemic mitral regurgitation assessed with an objective and sensitive technique; namely magnetic resonance imaging. We also get an insight into PMA, a technique that was lost over time. Despite a smaller number of subjects compared with other animal studies,^{8,9} the findings show a superior effect of PMA on ventricular remodeling with UMA having negative remodeling with more diastolic dysfunction, less torsion, and weaker ventricles. Xu and colleagues¹² demonstrate the pathophysiology underlying the disadvantages of UMA found in clinical studies.¹¹

This work by Xu and colleagues¹² is thought-provoking in times of a trifurcation in the treatment of ischemic mitral regurgitation: replacement, repair, and transcatheter edge to edge. These data should encourage further investigation into PMA as a repair option for ischemic mitral regurgitation.

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