

## **Benefit of Surgery for Secondary Mitral Regurgitation**

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In secondary mitral regurgitation (MR), the mitral valve (MV) leaflets are normal, and the disease involves the myocardium rather than valve itself. Mechanism of secondary MR is classified as functional, because mitral valve is structurally normal and disease results from malcoaptation of leaflets caused by ventricular remodeling. Dilatation and dysfunction of left ventricle (LV) causes displacement of papillary muscles, which results in leaflet tethering that prevents coaptation of MV leaflets. Secondary MR is classified into ischemic MR and non-ischemic MR according to the etiology of LV dysfunction. Ischemic MR is a consequence of adverse LV remodeling after myocardial ischemic injury with enlargement of the LV and mitral annulus, leaflet tethering, and reduced closing forces. Ischemic chronic MR is defined as MR occurring > 1 week after myocardial infarction with (1) global or regional LV systolic dysfunction; (2) significant coronary artery disease; (3) no evidence of primary valvular, chordal or papillary muscle pathology. In non-ischemic secondary MR, idiopathic myocardial disease causes severe LV dysfunction and functional MR. The presence of chronic secondary MR worsens the prognosis of patients with LV systolic dysfunction and symptoms of heart failure. Prognosis is poor for both ischemic and non-ischemic MR, but revascularization has been associated with improved survival in patients with ischemic MR.

### **1. Pathophysiology**

Pathophysiology of secondary functional MR is more complex than that of organic MR. The degree of functional MR can fluctuate dynamically with volume status, afterload, heart rhythm, myocardial ischemia and inotrope administration. There is greater difficulty in assessing the severity of MR in patients with secondary functional MR and adverse outcomes are associated with a smaller effective regurgitant orifice (ERO) area, because smaller amount of MR further increases atrial pressure and heart failure in the presence of compromised LV systolic function and baseline elevated filling pressures. As patients with an ERO area larger than 0.20 cm<sup>2</sup> incur a two-fold increase in mortality risk and a four-fold increase in the risk of heart failure, functional MR is graded as severe when an ERO area larger than 0.20 cm<sup>2</sup>. Functional MR will likely progress because of the progression of LV systolic dysfunction and adverse remodeling.

## **2. Surgical Indications for Secondary MR**

Outcomes after surgery for secondary functional MR remain suboptimum. Operative mortality is still high despite advances in surgical techniques, and there are few data to indicate that correcting functional MR prolongs life or even improves symptoms over an extended time. These suboptimum outcomes explain uncertainties in surgical indications.

### **1) Moderate MR**

Because functional MR may be a surrogate marker for severe dysfunction and adverse remodeling of LV, it may not be directly responsible for the poor prognosis, and correction of moderate MR may not have an impact on prognosis if the underlying LV function remains poor. However, it may be helpful to address moderate MR when other cardiac surgery is being performed. Because adding MV replacement to other cardiac surgery increases surgical risk, it seems logical that repair would be preferred in such instances. When the ischemic MR is moderate, the question has been whether coronary artery bypass graft (CABG) alone will suffice or MV repair is required. The Cardiothoracic Surgical Trials Network recently reported that the addition of MV repair to CABG did not result in a higher degree of LV reverse remodeling. This randomized trial did not show a clinically meaningful advantage of adding MV repair to CABG. The preferred treatment strategy for these patients remains controversial.

### **2) Ischemic severe MR**

There is no proof that correction of chronic ischemic MR at the time of CABG is effective in prolonging life or relieving symptoms, but it seems wise to address the mitral valve during CABG operations, because failure to correct chronic ischemic MR by revascularization alone may leave the patient with severe residual MR. Current guidelines recommend consideration of MV repair or chordal-sparing replacement for severe ischemic MR, although the question of which surgical strategy is more effective remains unclear. The Cardiothoracic Surgical Trials Network recently reported two-year outcome of MV repair versus replacement for severe ischemic MR. CABG was concomitantly performed on 74% of study patients. In this randomized trial, there was no significant between-group difference in LV reverse remodeling or survival at 2 years. However, MR recurred more frequently in the repair group, resulting in more heart failure-related adverse events and cardiovascular admissions.

### **3) Non-ischemic severe MR**

There is remarkably little evidence that correcting chronic severe secondary MR prolongs life or even improves symptoms for a prolonged period. This paradox may result from the fact that mitral surgery does not prevent the continued idiopathic myocardial deterioration in non-ischemic chronic secondary MR. Mitral valve repair or replacement may be considered for severely symptomatic patients (NYHA class III to IV) with chronic severe secondary MR (stage D) who have persistent symptoms despite optimal medical therapy for heart failure.

## References

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