

JACC

The Journal of the American College  
of Cardiology

JACC: Cardiovascular Imaging

Editorial and Viewpoints

Proportionate and Disproportionate Functional  
Mitral Regurgitation:

A New Conceptual Framework That Reconciles the  
Results of the MITRA-FR and COAPT Trials

Paul A. Grayburn, Anna Sannino, Milton Packer

2018 Dec, 12 (2) 353–362

<https://doi.org/10.1016/j.jcmg.2018.11.006>

# Abstract

Traditional approaches to the characterization of secondary or functional mitral regurgitation (MR) have largely ignored the critical importance of the left ventricle (LV). We propose that patients with secondary MR represent a heterogeneous group, which can be usefully subdivided based on understanding that the effective regurgitant orifice area (EROA) is dependent on left ventricular end-diastolic volume (LVEDV). According to the Gorlin hydraulic orifice equation, patients with heart failure, an LV ejection fraction of 30%, an LVEDV of 220 to 250 ml, and a regurgitant fraction of 50% would be expected to have an EROA of  $\approx 0.3 \text{ cm}^2$  independent of specific tethering abnormalities of the mitral valve leaflets. The MR in these patients is proportionate to the degree of LV dilatation and can respond to drugs and devices that reduce LVEDV. In contrast, patients with EROA of 0.3 to 0.4  $\text{cm}^2$  but with LVEDV of only 160 to 200 ml exhibit degrees of MR that are disproportionately higher than predicted by LVEDV. These patients appear to preferentially benefit from interventions directed at the mitral valve. Our proposed conceptual framework explains the apparently discordant results from 2 recent randomized controlled trials of mitral valve repair. The MITRA-FR (Percutaneous Repair with the MitraClip Device for Severe Functional/Secondary Mitral Regurgitation) trial enrolled patients who

had MR that was proportionate to the degree of LV dilatation, and during long-term follow-up, the LVEDV and clinical outcomes of these patients did not differ from medically-treated control subjects. In comparison, the patients enrolled in the COAPT (Cardiovascular Outcomes Assessment of the MitraClip Percutaneous Therapy for Heart Failure Patients with Functional Mitral Regurgitation) trial had an EROA  $\approx$ 30% higher but LV volumes that were  $\approx$ 30% smaller, indicative of disproportionate MR. In these patients, transcatheter mitral valve repair reduced the risk of death and hospitalization for heart failure, and these benefits were paralleled by a meaningful decrease in LVEDV. Thus, characterization of MR as proportionate or disproportionate to LVEDV appears to be critical to the selection of an optimal treatment for patients with chronic heart failure and systolic dysfunction.

***J Am Coll Cardiol Cardiovasc Imaging.***

*Editorial and Viewpoints*

2018 Dec, 12 (2) 353–362

<https://doi.org/10.1016/j.jcmg.2018.11.006>