
The authors, from Duke Clinical Research Institute, retrospectively researched the outcomes of high-risk mitral regurgitation (MR) patients who received either non-surgical therapy, or surgical intervention via MitraClip procedure at Duke Medical Center over a period of 6 years. High-risk mitral regurgitation patients often do not qualify for, or receive, surgical intervention, and instead receive only medical treatment. The authors documented improved mortality for patients receiving MitraClip treatment as compared to medical therapy at both 30 days and 1 year in this retrospective analysis of high-risk MR patients.

The goal of this study was to analyze the outcomes of high-risk MR patients who received medical therapy, as the clinical trials for MitraClip included randomization to standard surgical intervention or MitraClip therapy, but did not include a randomization to medical therapy. The authors were able to document improved survival for the MitraClip patients over medical therapy. This is relevant to all clinicians treating heart failure patients with MR, as it demonstrates improved outcomes for percutaneous surgery over the traditional medical treatment most high-risk MR patients receive.


Mortality for patients with severe mitral regurgitation (MR) is significant, regardless of any intervention. The goal of this multicenter retrospective study was to investigate whether any intervention could demonstrate improved survival for severe MR patients. This is the largest study to date of MR patients with severe LV dysfunction, and is unique in both the large number of patients and the types of interventions analyzed, including CABG, CABG plus MV surgery, percutaneous intervention, and medical therapy. The results demonstrated improved outcomes for patients who received any type of surgical intervention, despite their high-risk classification.

The relevance for heart failure clinicians is to reinforce the importance of considering all treatment options, including surgery, for high-risk patients with MR and LV dysfunction, with the goal of improving survival and outcomes for these challenging patients.

The authors, investigators for the Cardiothoracic Surgical Trials Network (CSTN), describe the results of a prospective, randomized clinical trial, in which 301 patients with moderate ischemic mitral regurgitation (IMR) were assigned to coronary artery bypass graft (CABG) or CABG with concomitant mitral valve repair. The study was funded by a cooperative agreement with the National Heart, Lung and Blood Institute (NHLBI), including funding from the National Institute of Neurological Disorders and Stroke (NINDS), and the Canadian Institutes of Health Research (CIHR). This study was a follow-up trial to the smaller RIME trial (noted later in this bibliography), which was terminated early due to slow enrollment. The study by the CSTN investigators was the first large-scale randomized prospective clinical trial to use left ventricular end-systolic volume index (LVESVI) as the primary endpoint to determine whether “prophylactic” mitral valve repair at the time of CABG could improve left ventricular reverse remodeling in patients with moderate IMR. Both groups of patients showed improvements in LVESVI, and this study demonstrated that CABG alone provides improvement in left ventricular reverse remodeling. With no significant difference between the two groups of patients, there is no compelling clinical benefit to performing mitral valve repair at the time of CABG. The value of this research for the heart failure practitioner is in the affirmation that CABG alone provides clinical benefit to patients with ischemic mitral regurgitation, and postponing valve repair decisions until patients can be re-evaluated post-CABG will not significantly impact patient outcomes, or progression of heart failure. The question of whether to perform CABG or CABG plus mitral valve repair in patients with IMR was not answered by this trial.


This article, published in 2012, provides the results of the smaller RIME Trial, which was funded by the United Kingdom’s Department of Health and National Institute for Health Research (NIHR), the British Heart Foundation (BHF), and the British Medical Association (BMA). It was also supported by the NIHR Cardiovascular Biomedical Research Unit of the Royal Brompton and Harefield National Health Service Foundation Trust and Imperial College London, and was sponsored by Imperial College London.

The RIME trial, like the CSTN trial listed earlier in this bibliography, also sought to determine whether there is any clinical benefit to mitral valve repair at the time of CABG in patients with ischemic mitral regurgitation (IMR). Unlike the CSTN trial, the RIME investigators utilized peak oxygen consumption as their primary endpoint, and only enrolled 73 patients. The study was stopped early when an interim analysis showed benefit in the CABG plus mitral-valve-repair arm of the study. The early stoppage may have contributed to an overestimation of the treatment benefit. Heart failure practitioners will find this article useful to demonstrate the research behind the view that CABG plus mitral valve repair can improve clinical status for patients with IMR. However, the limitations and results of this smaller trial do not provide a definitive answer to the ongoing question of whether to pursue mitral valve repair at the time of CABG.

This retrospective study, undertaken by Duke University Medical Center researchers, also sought to analyze outcomes of patients with ischemic mitral regurgitation (IMR). However this study was intended to specifically look at survival outcomes and was expanded to include not only CABG and CABG plus mitral valve repair patients, but also those patients who received medical treatment alone, or underwent percutaneous coronary intervention. The authors also expanded the selection criteria to include patients with moderate or severe IMR. Because this study extended back over a 20-year period, the researchers were able to include data from 4,989 total patients. The data analysis concluded that patients with IMR who underwent either PCI or CABG (with or without mitral valve repair or replacement), demonstrated “significantly” longer survival as compared to medical management. The relevance of this data analysis for heart failure practitioners is to reinforce the survival benefit of revascularization for patients with IMR, with a stronger benefit from CABG, but still a benefit from PCI, as opposed to medical treatment alone.


In 2012 the ESC and EACTS updated and revised their guidelines for the management of valvular heart disease, updating a previous version published in 2007. Guidelines for medical management, mitral valve repair and replacement, and newer transcatheter treatments for mitral regurgitation are addressed, incorporating the most recent research (as of 2012) into the guidelines. Heart failure practitioners should use these guidelines to help guide decisions on management and treatment of heart failure patients with mitral regurgitation. These guidelines should be referenced in conjunction with the ACC/AHA guidelines noted later in this bibliography. The value of guidelines is to help establish standards of practice which transcend country borders and continents.


Many patients for whom mitral valve surgery is indicated, do not undergo surgery due to other comorbidities which place them at higher surgical risk. The EVEREST II (Endovascular Valve Edge-to-Edge Repair Study) prospective randomized controlled clinical trial was designed to assess the safety and efficacy of percutaneous mitral valve edge-to-edge repair (using the MitraClip device from Abbott Vascular) in higher risk patients with significant MR. The percutaneous procedure avoids open surgery and cardiopulmonary bypass, which should reduce overall surgical risk for patients undergoing the procedure. In this article, the investigators report the outcomes of the trial based on results from 327 patients, which concluded the use of the MitraClip device met all effectiveness outcomes at 12 months of follow-up: significantly reduced MR, improved clinical symptoms, and decreased LV dimensions. The relevance of this article for heart failure practitioners is the positive news for high-risk patients with symptomatic mitral regurgitation for whom surgery might not previously have been an option. Heart failure clinicians should consider referring even high-risk patients for evaluation for newer treatments.

This additional publication from 2013 on EVEREST II (Endovascular Valve Edge-to-Edge Repair Study) provided four-year follow-up results for this study. These longer-term results demonstrate that the percutaneous procedure has no increased risk for the high-risk MR patients, however the mortality is similar to conventional surgical repair. Due to the incidence of repeat procedures for MR after the percutaneous procedure, subgroup analysis is warranted, and the authors suggest further analysis specifically for those patients with functional MR.


Secondary MR is also called functional MR, and patients with secondary MR are difficult to assess, and a challenge to manage. The definition of “severe” secondary MR is a highly controversial issue, especially after the publication of the updated ACC/AHA guidelines for management of patients with valve disease (noted later in this bibliography), with new definitions based on measurements of effective regurgitant orifice area (EROA) and regurgitant volume (RVol). With this definition, clinicians face even greater challenges to evaluate patients using these criteria. The authors caution clinicians to continue to use all available data to determine the severity of functional MR, not just EROA and RVol. The information from this article, in conjunction with the additional functional MR article noted below, provide a solid framework to help the heart failure clinician understand, assess, and manage functional MR in conjunction with a comprehensive heart failure management program.


This recent article, published in 2015, provides a thorough overview for understanding, evaluating and managing functional MR patients. Building on the article from Grayburn, et al, noted above, the authors emphasize the importance of thorough evaluation of the level of functional MR prior to determining the best course of action, and also discuss the role of medical management, device-based treatments, and surgical interventions in the context of a multidisciplinary heart failure management team. Heart failure practitioners will find this article to be a useful reference for understanding the prognosis and management of functional MR patients, based on all evidence available at this time.


In 2014, the joint task force of the ACC and AHA updated and revised their guidelines for the management of valvular heart disease, updating a previous version published in 2008. Newer transcatheter treatments for mitral regurgitation are addressed, incorporating the most recent research into the guidelines. The value of guidelines is to help establish standards of practice, which transcend borders and continents. These guidelines are the most recent guidelines published globally, and include research published through October, 2013. Heart failure practitioners should use these guidelines to guide decisions on management and treatment of heart failure patients with mitral regurgitation.