

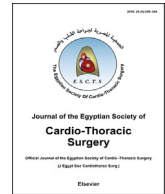
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One-year outcomes of concomitant mitral reduction annuloplasty repair with coronary artery bypass grafting for moderate ischemic mitral regurgitation

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ABSTRACT

Background: Mitral valve repair for chronic ischemic mitral regurgitation (IMR) in the published literature has contradictory outcomes. Here, we report our center outcomes of reduction annuloplasty technique in addition to myocardial revascularization to treat ischemic IMR over a four-year period.

Methods: Between January 2011 and December 2014, a total of 40 patients were identified to have a reduced left ventricular ejection fraction who underwent first-time mitral valve reduction annuloplasty concomitantly with coronary artery bypass grafting to treat moderate IMR. Variations in left ventricular end-systolic volume index (LVESVI), left ventricular ejection fraction (LVEF), functional class, and mitral regurgitation (MR) was followed up after surgery and retrospectively analyzed.

Results: In our cohort, mitral reduction annuloplasty was successful in helping 33 (82%) patients to have no residual MR and to downgrade their MR from moderate (grade 3+) to trace (grade 1+) in 7 (18%) patients before leaving the operating room. A change from baseline value was observed secondary to correction of MR. At 3-months follow-up time; the mean MR grade that was 0.2 ± 0.1 by the intraoperative assessment post-bypass has increased significantly to be 1.8 ± 0.4 ($p < 0.05$). Similarly, at one year after surgery it increased to 1.9 ± 0.3 , $p < 0.05$, compared to baseline value.

Remarkably, our patients showed a significant increase in the mean LVEF ($48 \pm 1.1\%$, $p < 0.05$), at 3-month visit and 1-year visit post-surgery ($47 \pm 4.2\%$, $\%$, $p < 0.05$) compared to the baseline values ($39 \pm 2.3\%$, $p < 0.05$ for both visits). While our patients showed gradually but non-significantly reduction in the mean LVESVI ($57.6 \pm 9.0 \text{ ml/m}^2$, $p > 0.05$) at early follow-up time, mean LVESVI improved significantly to be $47.6 \pm 11.0 \text{ ml/m}^2$, $p < 0.05$ at the one year. This statistically significant increase in the LVEF% at 3-month visit, in addition to the reduction in the LVESVI after one year were capable to induce substantial clinical change in NYHA functional class, which was observed early (at 3-month visit) where 35 (88%) patients became in NYHA class I and II and later (at 1-year visit post-surgery) where 32 (80%) patients stayed in NYHA class I and II.

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No deaths were reported during the one-year follow-up resulting in 95% survival rate. During the one-year follow-up time, 7 (18%) were readmitted to the hospital due to non-cardiac indications.

Early operative mortality (within 30 days after surgery) was 5%. One-year survival was 95%. The mean duration of follow-up was 1.1 ± 2.4 years (range, 1.0–3.5 years).

Conclusions: Mitral reduction annuloplasty concomitant to surgical myocardial revascularization may be sufficient to correct moderate IMR. It is associated with substantial improvement in early and intermediate-term survival rates, left ventricular functions, NYHA class and low incidence of recurrent MR.

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1. Introduction

Chronic ischemic mitral regurgitation (IMR) due to coronary artery disease pathology is a potential grave complication depending on its severity [1], which leads to adverse long-term outcomes [2]. Its mechanism is due to a complex pathology. It is a common complication of myocardial infarction [3]. In the cardiac surgical community, treatment of this complication remains unresolved problem [4] particularly the moderate form of IMR. This dilemma is due to the results of published literature are conflicting. Consequently, the benefits of adding mitral surgery to the revascularization on the clinical outcomes remain unclear in patients experiencing moderate IMR. Also, most of those patients' population would require prolonged pump run time due to the requirement of concomitant multivessel coronary revascularization and add extra time to address the mitral valve will have a price. Based on the analysis of the Society of Thoracic Surgeons adult cardiac surgery database, there was increased perioperative risk associated with prolonged times of aortic cross-clamping and cardiopulmonary bypass (CPB) [5]. Due to the clinical benefit of repairing moderate IMR concomitantly with the myocardial revascularization is unverified; the appropriate decision to address the moderate degree of IMR surgically remains controversial. Here, we are reporting our institution short-term results over a 4-year period.

2. Patients and methods

With getting an approval from our institutional review ethical board to waive the requirement for individual patient consent, we did a retrospective search of our hospital electronic database to identify the patients who underwent first time coronary artery bypass grafting (CABG) concomitantly with mitral valve repair (MVR) surgery for IMR that came up with 53 patients. However, after conducting a detailed chart review of those patients, to validate the diagnosis of IMR to exclude those patients with non-ischemic mitral valve pathology (congenital, rheumatic, myxomatous, or infective endocarditis) and patient with mild or severe MR. Based on a thorough reviewing of their preoperative echocardiogram, operative details and pathology reports, we found forty patients had undergone combined coronary revascularization in combination with MVR between January 2011 and December 2014 and all had moderate IMR (grade 3+) pre-surgery. We did not include any patients who had surgery after December 2014 to allow for at least one-year follow-up. Also, patients with previous cardiac surgery, surgery for papillary muscle rupture, post-infarction ventricular septal defect (VSD) or other combined procedures (except for MAZE procedure, tricuspid repair or atrial septal defect closure) were excluded. Baseline characteristics, operative variables, hospital outcomes, 3-month visit, and one-year follow-up were retrospectively analyzed. We collected the entire relevant baseline, and the New York Heart Association (NYHA) functional classes were assessed during the different follow-up visits.

2.1. Echocardiography

To avoid the downgrading of the severity of MR due to decreased the after load during anesthesia, all patients had a transthoracic (TTE) and transesophageal echocardiogram (TEE) within a week before surgery. Intraoperatively, to estimate how much of residual regurgitation following MVR, we did a TEE after coming off bypass to ensure that no significant MR was left behind before the patients leave the surgical room. In addition, TTE was done routinely just before discharge. To detect recurrent MR regurgitant jet area was calculated; to assess the left ventricular (LV) function, left ventricular ejection fraction (LVEF) was measured; to evaluate the LV reverse remodeling, LV end-systolic volume index (LVESVI) was estimated. As a follow-up, TTE was done at a 3-month time and 1-year post-discharge. In our cohort, we defined the degree of MR severity based on the size and geometry of the regurgitant jet according to Aklog et al. [6], where he classified MR on a scale of 0–4 + into 0+, none; 1+, trace; 2+, mild; 3+, moderate; and 4+, severe degree. Independently, two echocardiographers reviewed all the videotape of the study to have a consensus. A third echocardiographer was involved in solving any disagreement in this semiquantitative method to assess the severity.

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