



ORIGINAL ARTICLE

Mitral Valve Repair Versus Replacement in Patients with Ischemic Mitral Regurgitation

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ABSTRACT

Background: Approximately 20 to 30 percent of patients experience Ischemic Mitral regurgitation after MI, with extreme IMR occurring in more than 10 percent of patients. Guidelines for appropriate surgical modality, whether for reconstruction or replacement, are still under review. Aim of the study: To compare the outcome of patients with Ischemic mitral regurgitation who underwent CABG with either mitral valve replacement or repair in 2 years follow up.

Methods: The selected patients with ischemic mitral regurgitation underwent CABG and mitral valve replacement or repair at the cardiothoracic surgery department, zagazig university during the period from July 2016 to June 2018 with postoperative follow up of 2 years.

Results: we found no significant difference between patients of group 1 (Mitral v replacement) 22 patients and group 2 (Mitral v repair) 24 patients regarding preoperative, operative characteristic, operative data and early postoperative follow up with significant difference between the 2 groups regarding recurrence of (mitral regurgitation) MR in which 25% of the patients of repair group developed significant MR at the end of 2 years the follow up period

Conclusions: The best surgical solution is problematic due to minimal scientific data. According to existing research, the role of MV replacement tends to be warranted in patients with extreme IMR.

Keywords: Repair; Replacement; CABG.



INTRODUCTION

Ischemic mitral regurgitation (I.M.R) had a common important complication after myocardial infarction. The presence of I.M.R had estimated to be 20% to 30% after acute myocardial infarction [1]. The pathophysiological mechanism of I.M.R includes adverse remodeling of left ventricle, mitral annular dilatation, leaflet tethering.[2] mitral (M.R.) following myocardial infarction had common, presages a doubling in mortality for those with at least mild. The disorder reflects disease of the myocardium, rather than an abnormality of itself. Technique practice guidelines support intervention for severe M.R, but critical had lacking to inform whether repair or replacement had the superior technique approach [3].

A poor prognosis had predicted by the existence of I.M.R For less than severe I.M.R artery bypass grafting (C.A.B.G) alone had recommended by guidelines as additional M.V. technique would not add benefit to the short-, long-term outcome for cases [4]. The appropriate technique management of moderate I.M.R at the time of C.A.B.G remains controversial. Some experts advocate revascularization alone for moderate I.M.R, expecting improvements in regional, global LV function, geometry after C.A.B.G to lead to a reduction in M.R [5]. Others support restrictive mitral annuloplasty (R.M.A) repair at the time of C.A.B.G to address the I.M.R more directly, expecting to prevent further adverse remodeling, to decrease the risk of heart failure. Importantly, the addition of a mitral procedure to C.A.B.G technique

necessitates open heart exposure had associated with longer durations of aortic cross clamping and cardiopulmonary bypass which could increase perioperative risk. However the optimal technique for severe I.M.R had still debatable [6]. There had lots of reviews comparing these 2 technique techniques in the past few decades, the recommendation had divergent. The procedure guideline had defined extreme I.M.R as a Class I indication for technique care. Aim of the study; in our current retrospective study the technique outcomes of cases with artery disease, I.M.R operated by concomitant C.A.B.G, either mitral replacement or mitral repair in 2 years postoperative follow up had compared.

METHODS

The selected cases had 46 cases with mitral diagnosed with coronary artery disease who underwent C.A.B.G, mitral replacement or repair at the cardiothoracic technique department ,zagazig university during the period from July 2016 to June 2018. Written informed consent had obtained from all participants, the study had approved by the research ethical committee of Faculty of Medicine, Zagazig University. The study had done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for reviews involving humans. For both cases, the medical history had checked. Case preoperative baseline characteristics, operation-related parameters, postoperative complications, hospitalization duration, echocardiography data such as ejection fraction, residual mitral degree, mortality had included in the data collected. Extreme mitral in all cases, as determined by transeosophageal echocardiography (TEE) pre-operative. When a moderate or greater degree of mitral had observed during the follow-up echocardiography test, residual mitral had considered important. 22 cases underwent mitral replacement (M.V.R)treatment, had assigned to gathering 1, 24 cases underwent mitral repair, had assigned to gathering 2. All cases obtained full rigid ring annuloplasty with respect to mitral repair methods. Early mortality, defined as any death occurring within 30 days of technique

or prior to hospital discharge, long-term after 2 years of follow-up had the primary endpoints. Via midline sternotomy, with the use of cardiopulmonary bypass (C.P.B),moderate technique hypothermia (32 ° C), technique techniques had performed for all surgeries, blood antegrade cardioplegia. At the discretion of individual surgeons, the decisions to undertake repair or replacement had made. Concomitant bypass technique had performed on major arteries or branches that indicated a preoperative angiogram of more than 70% luminal stenosis.

STATISTICAL ANALYSIS

Central tendency statistical measures had used to analyze retrieved data, which had presented as mean \pm SD. Statistical critical had set at $p < (0.05)$. Analysis by SPSS version 17

RESULTS

Postoperative characteristics of case in the study (table 1).

From the data present in (table 2), we found no critical between cases of gathering 1, gathering 2 regarding operative characteristic of cases in the study.

Table (3) shows postoperative characteristics of cases in the study, IABP= intra-aortic balloon pump, AF= atrial fibrillation, A.R.F= acute renal failure, P.N.D= permanent neurologic dysfunction, LOIS= length of intensive care unit stay, L.O.H.S= length of hospital stay, L.V.E.F= left ventricular ejection fraction.

From the data present in table 3, we found no critical between present cases of gathering 1, gathering 2 regarding postoperative characteristic of cases in the study.

Table (4) : Mitral recurrence among cases in the study, from the data present in table 4, figure 4 we found critical between the 2 gatherings regarding recurrence of (mitral) M.R at the end of follow up period, as we neglect cases with M.R severity less than moderate (critical M.R), we found that none of the cases that underwent mitral replacement develop critical M.R at the end of follow up period that had in contrast to cases that underwent mitral repair in which 25% of the cases develop critical M.R (equal to or more than moderate) at the end of follow up period.

Table (1): Preoperative clinical characteristics of cases in the study:

	Gathering 1 N0 22	Gathering 2 N0 24	P value
Age	61±6	59±9	0.699
DM	13 (62.5%)	16 (66.7%)	0.512
HTN	20 (87.5%)	20 (83.3%)	0.621
Dyslipidemia	16 (75%)	17 (70.8%)	0.601
CKD	1 (6.2%)	2 (8.3%)	0.411
Mean EF	33±4	35±2	0.619

Table (2): Shows operative characteristics of cases in the study

	Gathering 1 22	Gathering 2 24	P value
C.P.B.T (min)	163±17	181±25	0.439
A.C.C.T (min)	110±15	135±35	0.448
Number of grafts	2 ±0.75	2 ±0.9	0.799

C.P.B.T= cardiopulmonary bypass time, A.C.C.T= aortic cross clamping time.

Table (3): shows postoperative characteristics of cases in the study

	Gathering 1 (N=22)	Gathering 2 (N=24)	P value
Postoperative IABP	3 (12.5%)	4 (16.6%)	0.669
New-onset AF	4 (18.75%)	5 (20.8%)	0.676
A.R.F	1 (5.6%)	2 (8.3%)	0.521
PND	0 (0)	0 (0)	
Postoperative ventilator (hours)	65±32	52±21	0.465
LOIS (days)	6.5±8	7.5±12	0.711
L.O.H.S (days)	16±10	19±16	0.574
L.V.E.F on discharge	42±17	36±14	0.493
Early mortality	0	0	

Table (4): Mitral recurrence among cases in the study:

	Gathering 1 (N=22)	Gathering 2 (N=24)	P value
No M.R	19 (87.5%)	8 (33.4%)	0.031
Trivial M.R	3 (12.5%)	6 (25%)	0.044
Mild M.R	0 (0%)	4 (16.6%)	0.001
Moderate M.R	0 (0%)	4 (16.6%)	0.001
Severe M.R	0 (0%)	2 (8.4%)	0.001

DISCUSSION

Since optimum of I.M.R had still problematic, the protocol between cardiac surgeons varies considerably with regard to

I.M.R treatment. The general consensus for severe I.M.R had that technique had recommended. The most controversial issue had the role of combined therapy in cases

with moderate M.R (ERO >10 mm² but <20 mm²). In the absence of clear critical, the management could be individualized. The decision should integrate the presence of myocardial viability, ischemia, the dynamic component of M.R. It had important to predict whether revascularization would be associated with sufficient functional recovery especially at the level of the posterior basal wall, in turn, would decrease tethering forces increase mitral closing force thus correct or at least sufficiently reduce M.R [7].

The early mortality rates for mitral repair in our sample had close to those for M.V.R., we had not concentrated on long-term as long follow-up periods might be needed. This result might suggest that the two methods play a similar role. Micheal et al, In cases with extreme I.M.R, mitral repair had contrasted with M.V.R. Their reviews agreed with our findings, showed no substantial in left ventricular reverse remodeling or 1-year follow-up [9]. In a meta-analysis of 13 reviews, M.V.P had found to be with critical lower perioperative mortality. There had no critical regarding long-term mortality, reoperation. Mitral repair had associated with a critical higher critical of mitral.[10] This result had also reflected in our research, with a 25% residual or persistent mitral rate in the mitral repair gathering, compared to a 0.0% rate. It had well established mitral repair had superior to replacement for degenerative mitral disease. Mitral repair had an advantage of lower operative mortality, higher long-term, fewer valve-related complications, better preservation of ventricular function [11]. However, the benefit of M.V.P over M.V.R for severe I.M.R had not clear. Although several meta-analyses had reported their results on M.V.R versus M.V.P, these analyses had included reviews involving cases with less severe I.M.R (MR ≤ 2+). Wang, colleagues reported a subgroup analysis about repair versus replacement for severe I.M.R, only 3 included reviews had not enough to compare these 2 techniques [12].

Andalib A et al the contribute to preserve the subapparatus for protection of postoperative ventricular function had confirmed by large amount of reviews [13]. Recently,

preservation of both the anterior, posterior leaflets confirmed a greater benefit over the preservation of posterior leaflet alone in left ventricle remodeling, reducing systolic afterload, improving ventricle performance [14].

Recurrence of M.R had found to be a common complication for M.V. repair in the of I.M.R, degenerative M.R. Other reviews contribute further critical to the high recurrence of M.R after M.V. repair.[15,16]. This agree with study, we did find a critical in reoperation rate between these 2 treatments.

Daniel H et al. also agree with our observations that mitral repair cases had more critical mitral recurrences. This leads in more adverse conditions, readmissions associated with heart failure [17]. But, in both gatherings, had consistent within the trial cohort. Our findings had inconsistent with the findings of a Virk et al meta-analysis: that they contained twenty-two retrospective observational reviews, one R.C.T [18]. In the mitral valve repair community, retrospective reviews showed better long-term. Most of the reviews had followed for more than 3 years, we found. It could also be hypothesized that the effect could take a longer period of follow-up to become noticeable.

Meng-Lin Lee et al, strongly supported our results, revealed more critical of recurrence with cases treated with C.A.B.G, mitral repair with 57% recurrence of moderate or severe mitral although no in short, long term mortality [19].

Smith et al had shown that a reduced critical of moderate or extreme mitral, but an increased number of adverse events, had correlated with the combination of mitral valve repair with C.A.B.G. While mortality, major adverse cardiac injury rates did not vary substantially between the two classes, in the mitral repair community, the critical of neurologic events, supraventricular arrhythmias had higher. This had thought to be due to the longer C.P.BB required [20].

Damien et al found that the critical of technique revascularization plays a crucial role in viable myocardium. In cases with I.M.R, good revascularization had favourable for mitral function associated with decreased

left ventricular size, increased mitral closing power, improved papillary synchrony, increased myocardial contractility [21]. Messika-D et al suggested that progress in had limited to those with viable in cases with moderate I.M.R who underwent isolated C.A.B.G [22].

We recommend that extreme I.M.R cases should undergo M.V.R on the basis of two critical

randomized control trials. The underlying possible mechanism behind this recommendation is

that, while retaining comparable clinical to that of mitral repair, M.V.R offers more durable correction than mitral repair [23]. On the other side, for example, We propose that moderate I.M.R cases had subject to isolated C.A.B.G as long as the myocardium supplied by the target vessels had viable for revascularization. Therefore, another critical clinical factor for decision-making in cases with moderate I.M.R might be the myocardium viability test. The potential mechanism for isolated C.A.B.G rather than C.A.B.G plus mitral repair had that, as stated in Smith's report, the addition of mitral repair carries elevated risks of neurological events, supraventricular arrhythmias while offering no benefits compared to C.A.B.G alone. We also propose that repair of the mitral could then become necessary if there had no viable myocardium supplied by the target vessels to be revascularized [24].

CONCLUSIONS

In our study mitral repair might be equivalent to M.V.R in terms of early mortality, but two years after service, mitral repair had a higher risk of residual or repeated mitral due to minimal clinical critical, the optimal technique approach had controversial. The function of M.V.R seems to be justified in cases with extreme I.M.R, according to current literature.

Conflict of interest: none

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REFERENCES

- 1 - Mohebbali J, Chen FY. Mitral repair for ischemic mitral regurgitation. *Ann Cardiothorac Surg* 2015;4:284-90.
- 2- Asgar AW, Mack MJ, Stone GW. Secondary mitral regurgitation in heart failure: pathophysiology, prognosis, and therapeutic considerations. *J Am Coll Cardiol*. 2015; 65:1231–48
- 3- Deja MA, Grayburn PA, Sun B. Influence of mitral repair on in the technique for heart failure trial. *Circulation* 2012;125:2639-48.
- 4- Drake DH, Zimmerman KG, Hepner AM, Nichols CD. Echo-guided mitral repair. *Circ Cardiovasc Imaging* 2014;7:132-41.
- 5- Kron IL, Hung J, Overbey JR. Predicting recurrent mitral after mitral repair for severe mitral regurgitation. *J Thorac Cardiovasc Surg* 2015;149:752-61
- 6- LaPar DJ, Kron, IL,. update to the American Association for Thoracic Technique (AATS) consensus guidelines: ischemic mitral regurgitation. *J Thorac Cardiovasc Surg*. 2017;153:e97-e114.
- 7- Amanda A ,Daisuke F, Nonaka Mitral : Repair, Replacement or Nothing Seminars in cardiothoracic and vascular anaesthesia 2019 ;23 ;117—125
- 8-Rankin JS, Badhwar V, He X, Jacobs JP, Gammie JS, Furnary AP et al: The society of thoracic surgeons mitral valve repair/replacement plus coronary artery bypass grafting composite score: A report of the society of thoracic surgeons quality measurement task force. *Ann Thorac Surg* . 2017, 103(5):1475- 81.
- 9 -Michael A ,Michael K ,Louis P t, Alan J ,Annetine C ,Pierre V.. Mitral-repair versus replacement for severe mitral N Engl J Med. 2014 Jan 2;370(1):23-32
- 10 - Daniel G, Alan J. M ,Annetine C, Gelijns., Gorav A, Two-Year Outcomes of Technique of Severe Mitral N Engl J Med 2016; 374:344-53
- 11-Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP, Fleisher LA .Guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines.Circulation. 2017; 135:e1159–e1195 .
- 12 -Wang Xi ; Zhang Bo ; Zhang Ji ; Ying Yo ; Zhu Ch ; Chen Ba ,Repair or replacement for severe mitral Medicine: 2018 ; 97 ;(31) :11546
- 13-Andalib A, Chetrit M, Eberg M, Filion KB, Thériault P, Lange R, et al .A Technique Review, Meta-Analysis of Outcomes Following Mitral Technique in Cases with Critical Functional Mitral, Left Ventricular Dysfunction. *J Heart Dis*. 2016;25(6):696–707.
- 14_Zhibing Qiu, Xin Chen, Ming Xu, Yingshuo Jiang, Liqiong Xiao, LeLe Liu . Is mitral valve repair superior to replacement for chronic ischemic mitral regurgitation with left ventricular dysfunction? *Journal of Cardiothoracic Surgery* 2010; 5: 107 ;5086 -99
- 15 Bart S, Ferket G, Ail A , Annetine C., Gelijns . Cost-Effectiveness of Mitral Valve Repair Versus Replacement for Severe Ischemic Mitral Regurgitation A Randomized Clinical Trial From the Cardiothoracic Surgical Trials Network

- Circulation: Cardiovascular Quality and Outcomes. 2018;11:e004466
- 16- Daniel P., Bruno V., Estibaliz C, Salma A., Amir H., Khalighi R., et al Mitral leaflet response to mitral regurgitation : from gene expression to tissue remodelling Journal of the Royal Society Interface 2020 ;17;(166):112-120
 - 17- Daniel H. Alina N Karen G. Zimmerman, B Ring Annuloplasty versus Valve Replacement for Secondary Mitral Regurgitation: Has Imaging Made the Binary Approach Obsolete? American Society of Echocardiography News Council on Perioperative Echocardiography (COPE) Communication 2019; 32;(10):A25-A27.
 - 18- Virk SA, Sriravindrarajah A, Dunn D. A metaanalysis of mitral repair versus replacement for mitral. Ann Cardiothorac Surg 2015;4:400-10.
 - 19- Meng-Lin Lee, Thay-Hsiung Ch, Hsien-Da H : Mitral repair versus replacement in cases with mitral regurgitation . J Thorac Dis. 2018 ;10(5):2820-28.
 20. Smith PK, Puskas JD, Ascheim DD. Surgical treatment of moderate ischemic mitral regurgitation. N Engl J Med 2014;371:2178-88.
 21. Damien J. LaPar, Irving L. Kron, Repair Techniques for Ischemic Mitral Regurgitation Cardiac surgery 2012 ;7,;(3) :204-212.
 22. Messika- D, Nickenig G, Latib A, Kuck KH, Baldus S, Schueler R, et al. Transcatheter mitral repair for functional mitral regurgitation using the Cardioband technique: 1 year outcomes. Eur Heart J. 2019;40(5):466–72.
 23. Fabien P, Nicolas B, Mohammad K, Lukas H, Aris M, Stefan S. et al, Interventional treatment of mitral regurgitation : an alternative to technique? Swiss Med Wkly. 2019;149:200 -23
 - 24 – Robert E, Micheal A. Surgecal management of moderate mitral regurgitation at the time of coronary artery bypass grafting remains controversial 2018 ; 156 ; 4, 1498-1500

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