

Study Comparing Quality of Life between Mitral Valve Repair and Mitral Valve Replacement

Suranjan Halder¹, Haripada Das², Ashis Halder³, Debabrata Biswas⁴

¹Associate Professor, Department of CTVS, NRS Medical College and Hospital, Kolkata, India

²Associate Professor, Department of Cardiac Anesthesiology, NRS Medical College and Hospital, Kolkata, India

³Associate Professor, Department of CTVS, NRS Medical College and Hospital, Kolkata, India

⁴Consultant Cardiac Surgeon, BM Birla Heart Research Centre, Kolkata, India

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Corresponding Author: Dr. Ashis Halder

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Abstract

Objectives: Among the Vulvular heart diseases, Mitral valve disease is the most frequent form of Vulvular heart diseases leading to cardiovascular morbidity and mortality globally. Mitral valve repair (MVr) has gained more attention since mitral valve replacement (MVR) is associated with some critical complications. The present study was conducted to evaluate and compare MV repair and replacement on recovery from surgery, with a focus on postoperative quality of life and health status over one year of follow up period.

Methods: The present descriptive observational study with prospective design was conducted at a tertiary level healthcare institute in the city of Kolkata, West Bengal, over a period of one year. A total of 65 patients with mitral regurgitation admitted for mitral valve surgery in the department of Cardio-thoracic and Vascular surgery at the institute were interviewed using a pre-tested and pre-designed schedule and observing and recording the clinical variables after obtaining the ethical clearance from the institute and informed consent from each subject. Quality of life was evaluated with the Medical Outcomes Trust Short-Form 36-item Health Survey (SF-36) scale. Inferential statistics either by parametric or non-parametric tests according to the data distribution for continuous variables and Chi-square test categorical variables was performed to elicit association; p value of less than 0.05 was considered statistically significant.

Results: The mean age (SD) of the study population among MV repair was 53.4 (± 12.4) years and among MV replacement was 57.2 (± 11.6) years. There was a gradual improvement in the NYHA functional class from baseline to 12 months follow-up time for both treatment groups. The mean value of various parameters of the SF-36 scores increased more among the patients of MV repair than replacement over one year of follow up period.

Conclusion: There was marked and significant improvement in parameters like Physical function, Role limitation, Bodily Pain, General health and Social function among the patients with MV repair than replacement.

Keywords: Mitral regurgitation, Mitral valve surgery, Quality of life, SF-36 scale.

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Introduction

Vulvular heart diseases are regarded as a global public health problem and are prevalent throughout the world and considered as a leading cause of cardiovascular morbidity and mortality worldwide [1-5]. Among the Vulvular heart diseases, Mitral valve disease is the most frequent form of presentation largely affecting the elderly [3]. Mitral valve diseases include both mitral valve stenosis (MS) and mitral valve regurgitation (MR). It has been estimated that, MR accounts for 32% and MS 12% of all types of heart valve disease [6].

Mitral regurgitation has been classified as either primary (a structural or degenerative abnormality of the mitral valve apparatus) or secondary (a disease of the left ventricle, which interferes with the

function and integrity of the mitral valve apparatus) regurgitation of the mitral valve [7, 8]. Rheumatic heart disease (RHD) is the most common cause of MS, but severe calcification of the mitral annulus with extension into the leaflets can restrict left ventricular inflow among the elderly [9].

Vulvular heart diseases if untreated may bear serious signs and symptoms and can cause permanent myocardial damage. Therefore, the optimal timing for the surgical correction of valve disease is before these consequences [10]. Moreover, structural valve disease became surgically accessible after the introduction of the cardiopulmonary bypass system.

Traditionally, replacement of the damaged heart valve was the preferred choice in surgical treatment, as it is technically easier and has satisfactory outcome. In the last decade, mitral valve repair (MVR) has become more popular, since mitral valve replacement (MVR) is associated with some critical complications e.g., higher risk of thromboembolism, endocarditis, and left ventricular dysfunction [11-14]. Mitral valve repair is therefore gaining more attention today [15]. Mitral valve replacement is considered in patients with ischemic valvular disease, as the duration of cardiopulmonary bypass machine use is longer in MVR [16]. Although, previous studies did not find any significant difference between MVR and MVR in terms of long-time survival and mortality rates in patients with ischemic mitral valve disease [17,18].

There is a lack of data comparing these two procedures in this part of the world. Mitral valve replacement is the most commonly performed operation in our centre for mitral regurgitation. As the institute is a tertiary level healthcare facility, many of the patients are from remote areas, and often it becomes difficult to follow up the post-operative quality of life, health status and complications, particularly in respect to strict control of INR. In this context, the present study was conducted to evaluate and compare MV repair and replacement on recovery from surgery, with a focus on postoperative quality of life and health status in a tertiary level healthcare facility in Kolkata.

Materials and methods:

An institution based descriptive observational study with prospective design was conducted at the Department of Cardiothoracic and Vascular Surgery (CTVS) of N. R. S. Medical College and Hospital, Kolkata over one year duration from March 2022 to March 2024. The study population was all the cases of mitral regurgitation admitted for mitral valve operation in the indoor ward of the institute during the study period.

Inclusion Criteria

- Age of more than 12 years
- Patient of either American Society of Anesthesiologists (ASA) grade I or II
- Giving informed consent

Exclusion Criteria

- Previous MV surgery
- Required concomitant aortic valve surgery
- Too sick to communicate or operate
- Refusal to consent

All the cases of mitral regurgitation admitted for mitral valve operation in the institute during the study period were approached and after applying inclusion and exclusion criteria, a total of 65 mitral regurgitation cases were included using total

enumeration technique. MV repair was done among 35 patients and MV replacement among 30 patients depending upon the calcification and deformity of the mitral valve.

After obtaining all the necessary approvals and permission and informed consent from each study participants, each subject was interviewed using the Pre-designed and pre-tested schedule followed by relevant physical, clinical, laboratory and radiological examinations. Quality of life was evaluated with the Medical Outcomes Trust Short-Form 36-item Health Survey (SF-36) [19]. The SF-36 questionnaires were recorded at baseline and every follow up on 1, 3 and 12 month to assess the postoperative quality of life. Outcome and complications of patients were recorded at baseline and every follow up on 1, 3 and 12 month.

SF-36 is a general-purpose questionnaire comprehensively assesses 8 dimensions of health: physical function, role limitation attributable to physical problems, bodily pain, general health perceptions, vitality (energy and fatigue), social function due to physical or emotional problems, role limitation due to emotional problems, and mental health. The responses to each of these questions were summed and transformed to 8 individual scores, ranging from 0 to 100 for each domain, with higher scores indicating better functioning. Validity, reliability, and typical response rates of all SF-36 domains as quantitative measures of clinical symptoms and quality of life were independently established [20]. Collected data were checked for consistency and completeness. Data were entered into MS Excel and analysed using the SPSS version 20. Descriptive analysis was done in the form of proportion for categorical variables, mean (standard deviation) for continuous variables. Data was checked for normal distribution and appropriate parametric or non-parametric tests (Wilcoxon rank-sum test) were done. The difference between proportions was analysed using Chi square test; p value of less than 0.05 was considered statistically significant.

Ethical Issues

Approval was obtained from the Institutional Ethics Committee (IEC) of the institute prior to data collection. The results of the measurements were provided to the study subjects. Patients or primary caregivers were explained in their own-language about nature of study and procedures. They were assured about the confidentiality of information and its anonymity. Informed written consent was taken from each study participants. No additional investigation or intervention was undertaken other than what the subjects require for the management purpose of the illness.

Results

The present study was conducted among 65 patients with mitral regurgitation admitted for mitral valve surgery [MV repair n=35 and MV replacement n=30]. The mean age (SD) of the study population among MV repair was 53.4 ($\pm$ 12.4) years and among MV replacement was 57.2 ($\pm$ 11.6) years, and we

observed that patients among the MV replacement group had higher mean age than MV repair group, which was statistically significant (p value-0.021). The difference in distribution of other parameters like sex, hypertension, diabetes, NYHA class, presence of PAH and LVEF (%) among the group was not statistically significant (Table 1).

Table 1: Distribution of study subjects according to background characteristics (n=65)

Background characteristics	MV repair (n=35)	MV replacement (n=30)	Total n (column%)	p value
Age mean (SD) (years)	53.4 (12.4)	57.2 (11.6)	55.2 (11.8)	0.021
Sex				0.309
Female	12 (34.3)	14 (46.7)	26 (40)	
Male	23 (65.7)	16 (53.3)	39 (60)	
Hypertension				0.399
No	20 (57.2)	14 (46.7)	34 (52.3)	
Yes	15 (42.8)	16 (53.3)	31 (47.6)	
Diabetes				0.853
No	31 (88.6)	27 (20)	58 (89.1)	
Yes	4 (11.4)	3 (10)	7 (10.8)	
NYHA class III/IV				0.437
No	22 (62.8)	16 (53.3)	38 (58.5)	
Yes	13 (37.2)	14 (46.7)	27 (41.5)	
PAH				0.773
No	32 (91.4)	28 (93.3)	60 (92.3)	
Yes	3 (8.6)	2 (6.7)	5 (7.7)	
LVEF (%) mean (SD)	42.4 $\pm$ 12.0	40.0 $\pm$ 11.0	-	0.10

MV-mitral valve, SD-standard deviation, NYHA-New York Heart Association, PAH-pulmonary artery hypertension, LVEF-Left ventricular ejection fraction.

The difference in the distribution of clinical outcome in terms of Arrhythmia, readmission and mortality at 1 year of follow up post intervention was not statistically significant between the groups (Table 2). There was a gradual improvement in the NYHA functional class from baseline to 12 months follow-up time for both treatment groups, although it was not statistically significant (Table 3).

Table 2: Distribution of study subjects according to clinical outcome at 1 year of follow up post intervention (n=65)

Background characteristics	MV repair (n=35)	MV replacement (n=30)	Total n (column%)	p value
Arrhythmia	3 (8.5)	2 (6.7)	5 (7.7)	0.773
Readmission	4 (11.4)	3 (10)	7 (10.8)	0.853
Death	2 (5.7)	3 (10)	5 (7.7)	0.518

MV-mitral valve

Table 3: Distribution of study subjects according to NYHA class III/IV (n=65)

Timeline	NYHA class III/IV		p value
	MV repair (n=35)	MV replacement (n=30)	
Baseline	13 (37.2)	14 (46.7)	0.437
1 month	7 (20)	6 (20)	0.987
3 month	3 (8.5)	3 (10)	0.842
12 month	2 (5.7)	2 (6.7)	0.857

MV-mitral valve, NYHA-New York Heart Association

The analysis of SF-36 score showed the mean value of various parameters of the SF-36 scores increased more among the patients of MV repair than replacement over one year of follow up period (Table 4 and Figure 1-4).

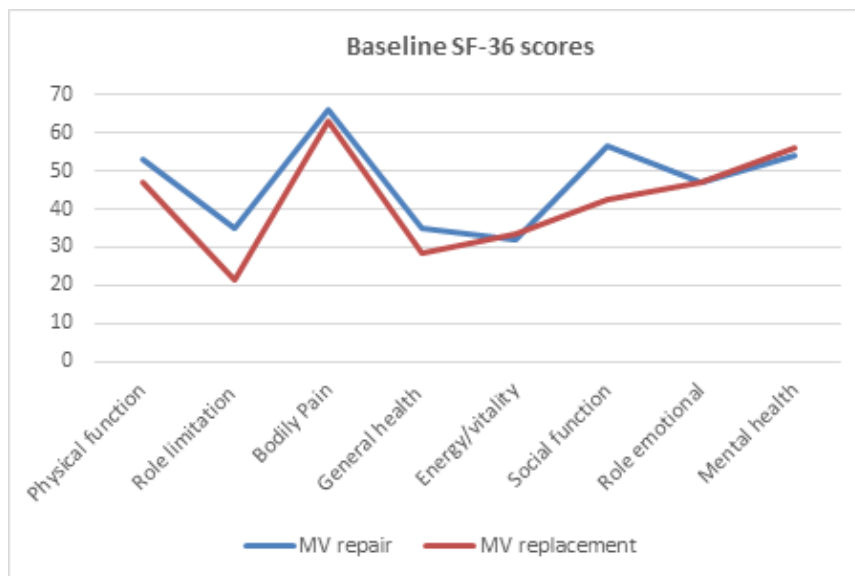


Figure 1: Distribution of SF-36 scores at baseline

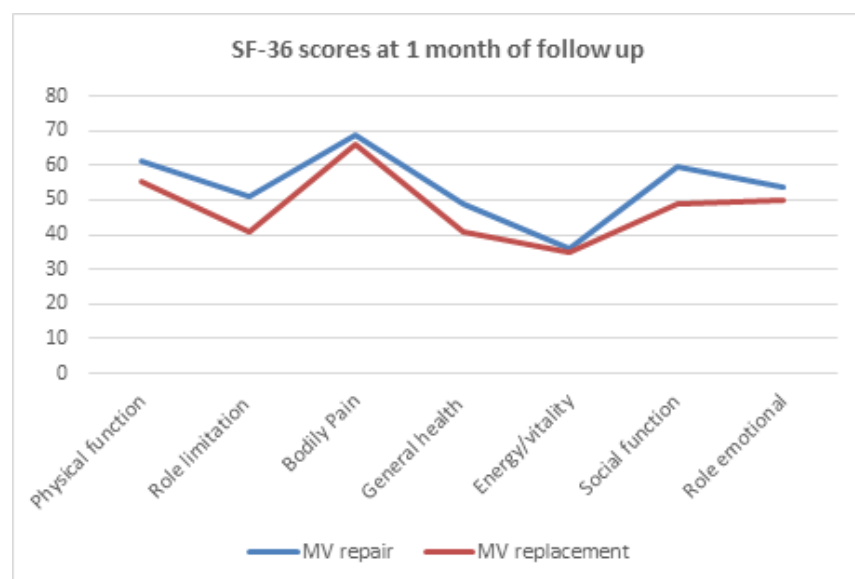


Figure 2: Distribution of SF-36 scores at 1 month of follow up

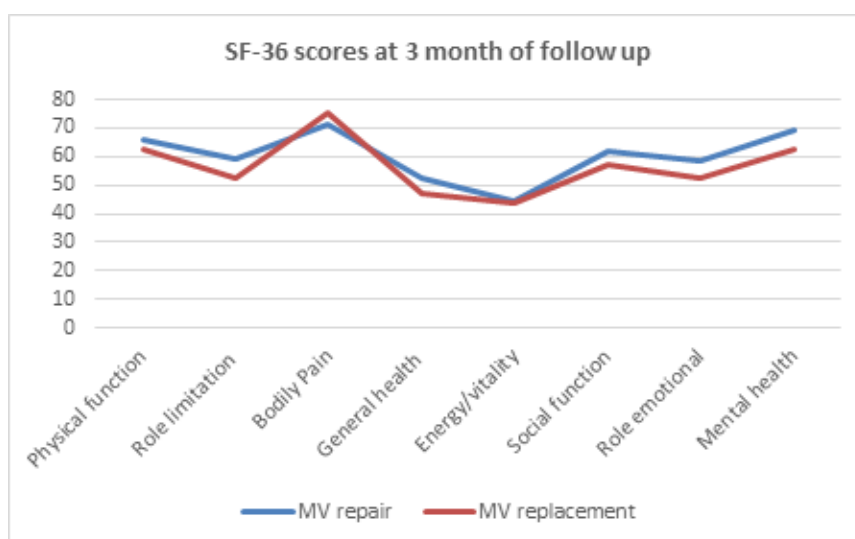


Figure 3: Distribution of SF-36 scores at 3 month of follow up

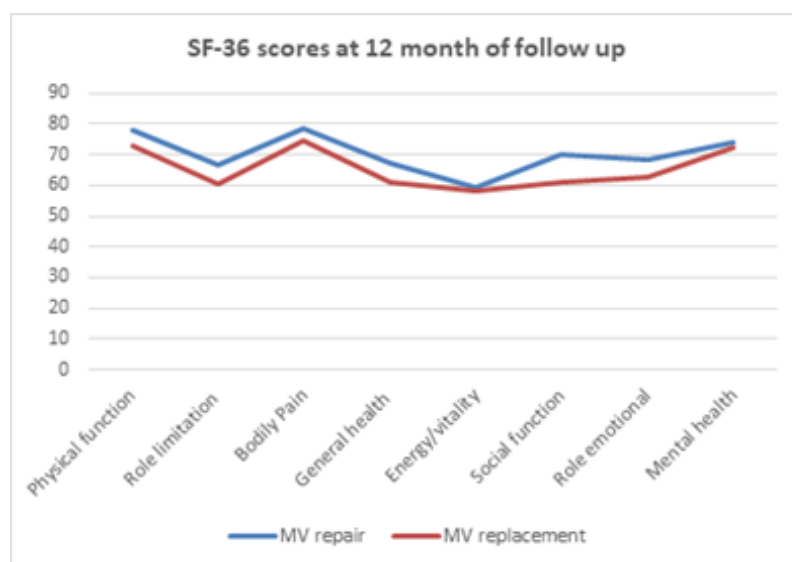


Figure 4: Distribution of SF-36 scores at 12 month of follow up

Table 4: Distribution and association of SF-36 scores among the study subjects

SF-36 score Mean (SD)	Baseline (n=65)		1 month (n=65)		3 month (n=63)		12 month (n=60)	
	1	2	1	2	1	2	1	2
Physical function*	53.2 (23.2)	47.1 (22.4)	61.1 (17.5)	55.5 (13.2)	65.6 (21.7)	62.5 (18.3)	78.1 (21.1)	72.7 (19.9)
Role limitation*	35.2 (18.2)	21.2 (13.2)	50.8 (18.9)	41.1 (15.2)	59.5 (20.3)	52.8 (21.5)	66.5 (18.4)	60.4 (17.7)
Bodily Pain*	66.2 (20.2)	62.8 (21.1)	68.5 (19.7)	66.2 (17.4)	71.1 (21.7)	75.2 (18.3)	78.6 (22.1)	74.4 (19.6)
General health*	35.2 (21.6)	28.4 (23.1)	49.0 (18.6)	41.1 (14.3)	52.2 (19.1)	47.3 (18.2)	67.3 (17.7)	61.1 (15.2)
Energy/vitality	32.1 (20.1)	33.7 (16.2)	36.2 (14.3)	34.9 (13.9)	44.2 (15.2)	43.6 (17.1)	59.6 (16.2)	58.1 (15.9)
Social function*	56.7 (21.9)	42.3 (22.0)	59.6 (19.8)	48.8 (17.6)	61.7 (22.6)	57.4 (15.2)	69.9 (18.2)	61.1 (17.3)
Role emotional	47.1 (24.1)	46.9 (22.7)	53.7 (21.1)	49.8 (20.2)	58.3 (22.7)	52.4 (18.3)	68.5 (14.2)	62.8 (13.6)
Mental health	54.2 (25.1)	55.9 (24.4)	58.3 (22.3)	56.6 (18.8)	69.2 (21.1)	62.3 (22.6)	74.3 (22.2)	72.6 (19.0)

1- Mitral Valve repair, 2- Mitral Valve replacement, *statistically significant at p value-<0.05, SF-36-Short-Form 36-item scale

Discussion

Mitral valve diseases among all the vulvular heart diseases, is the most prevalent form of presentation especially is related with significant mortality and morbidity among the elderly [3, 21, 22]. Therefore, the primary objective of the surgical approach is to reduce the mortality and morbidity rates of MVR or MVr.

Both these procedures have been found to be equally effective, although there are no strict rules in picking the either one. Presently, limited data are available describing the health status recovery for patients undergoing MV surgery in this part of the world. The present study was done to assess MV repair and replacement on recovery from surgery, with a focus on postoperative quality of life (using the SF-36

scale) and health status. The findings of the study are being discussed with relevant studies done elsewhere. In the present study, the mean age (SD) of the study population among MV repair was 53.4 (± 12.4) years and among MV replacement was 57.2 (± 11.6) years, and MV replacement group had significantly higher mean age than MV repair group (p value-0.021). As the age advances, the mitral valve becomes more calcified and tends to become more defunct for repair. The difference in distribution of other parameters like sex, hypertension, diabetes, NYHA class, presence of PAH and LVEF (%) among the group was not statistically significant. Zhao L et al. [23] in their study observed that patients in the MV replacement group were older than those in the MV repair group, which corresponds to our study finding. Whereas,

Zhao L et al. [23] in their study found that women were more likely than men to have MV replacement, but in the present study no differences were found in distribution of sex among the procedures, which may be due to different study setting or sample composition. Acker MA et al. [24] in their study observed similar distribution of sample characteristics to our study.

The present study found no significant difference in occurrence of Arrhythmia, readmission and mortality at 1 year of follow up post intervention in terms of clinical outcome between the groups. Zhao L et al. [23] observed that during follow-up, readmissions for cardiac events were low and there was no significant difference between the 2 treatment groups, and the commonest reason for readmission was cardiac arrhythmia. Zhao L et al. [23] found significant improvement in the NYHA functional class from baseline at each of the follow-up time points for both treatment groups. They also found that the percentages of patients in class III/IV were significantly lower for the MV repair group than for the replacement group at 3 and 12 months. Similarly, the present study also found that there was a gradual improvement in the NYHA functional class from baseline to 12 months follow-up time for both treatment groups, although it was not statistically significant. Acker MA et al. [24] stated that at 12 months, there was no significant between-group difference with respect to the composite end point of major adverse cardiac or cerebrovascular events between the procedures.

In the present study, the SF-36 scale analysis showed the mean value of various parameters of the SF-36 scores increased more among the patients of MV repair than replacement over one year of follow up period. There was marked and significant improvement in parameters like Physical function, Role limitation, Bodily Pain, General health and Social function among the patients in MV repair than replacement. Arnaz A et al. [25] in their study found significantly improved pain scores in MV repair, while no statistically significant improvement was seen in MV replacement. They also observed a significant increase in terms of general health perception scores and energy in both groups, while the increase was similar in both groups. The social function scores increased in both group, although the increase was statistically significant in MV repair only.

Zhao L et al. [23] showed that at 1 month of follow up, patients in both groups worsened in most subscales of SF 36, while improving in general health perception and mental health, with gradual improvement obtained in the MV repair group. From 3 months on, the effect of treatment on health status was persistent over time, with patients undergoing MV repair achieving better improvements in all domains, corresponding to our study findings.

The present study being a single centre descriptive study limits the generalization of our study findings, thus a larger multi-centric study with higher study design is recommended for further research in this area. In this study, blinding was not performed for assigning the patients into treatment groups, and the patients' knowledge of the procedure might have influenced responses to the SF-36 questionnaire.

Conclusion

The present study observed that MV replacement group had significantly higher mean age than MV repair group. There was a gradual improvement in the NYHA functional class from baseline to 12 months follow-up time among both treatment groups and no significant difference in occurrence of Arrhythmia, readmission and mortality at 1 year of follow up post intervention between the groups. There was marked and significant improvement in parameters like Physical function, Role limitation, Bodily Pain, General health and Social function among the patients in MV repair than replacement. This study suggests that MV repair should be strongly considered for mitral regurgitation whenever feasible.

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