

Original
Article

Comparison of the Health Related Quality of Life of Patients Following Mitral Valve Surgical Procedures in the 6-Months Follow-up: A Prospective Study

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Purpose: The aim of the present study is to evaluate the health-related quality of life of the patients who underwent mitral valve repair (MvRp) and mitral valve replacement (MVR). **Methods:** Within the scope of this prospective study design, 56 patients who had mitral valve operation between the years of 2011–2012 were enrolled in the study. 24 (42.8%) of these patients had MVR while 32 (57.1%) of them had MvRp. The health-related quality of life was evaluated according to the Turkey norms of Short Form 36 Quality-Of-Life Measures (SF-36), which were filled in by the patients before and 6 months after the operation. Moreover, preoperative risk factors affecting the quality of life (age, gender, functional capacity, rhythm, hypertension, diabetes, applied surgical method and echocardiographic results) were investigated for all the patients (n = 56) by using independent sample t test analysis.

Results: When the pre and postoperative changes were compared between the two groups, it was found out that there were no significant difference between the groups in terms of restraints on physical role functioning (PR), and the social role functioning values (SF) (respectively; $p = 0.097$, $p = 0.105$). However, in the comparison of pre-/postoperative changes between the groups, the changes in physical functioning (PF), bodily pain (BP), general health (GH), vitality (VT) and restraints on emotional role functioning (RE) and mental health (MH) values were found out to be significantly superior in the MvRp group than in the MVR group (respectively; $p < 0.01$, $p < 0.05$, $p < 0.01$, $p < 0.01$, $p < 0.05$ and $p < 0.01$). It was also confirmed that female gender, atrial fibrillation (AFR), and MVR method negatively affected the physical and mental components (respectively; $p = 0.033$, $p = 0.003$, $p = 0.015$).

Conclusion: Results of the SF-36 quality of life measures show that quality of life may be better in patients that have had MvRp. It should be considered that the planned surgical treatment method can affect the patient's quality of life, and this effect can indicate the success of the surgical treatment.

Keywords: quality of life, mitral valve, surgical procedures

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Introduction

The first successful mitral valve operation was performed by Elliot Cutler in 1923 as transventricular commissurotomy.¹⁾ The first successful prosthetic mitral valve implantation was carried out in 1959 by Nina Braunwald.²⁾ Prosthetic valves were developed to increase suitability for hemodynamic while reducing the thromboembolic complications. Within the same period, the biological valves were also produced.^{3,4)} Although thromboembolic complications in the mechanical valves and early degeneration of biological valves were the major disadvantages of mitral valve replacement (MVR), due to the high achievement drive of the method in terms of early post-surgical rehabilitation, it was used as the preferred method in the mitral valve surgery for many years.⁵⁻⁷⁾ However, during the last ten years, thanks to the better standardized rehabilitation techniques, surgeons gained experience and in this way mitral valve repair (MvRp) has become the preferred method in mitral valve surgery.^{5,6)} The success of the mitral operations has increased due to the standardization of surgical techniques and comprehensive post-operative intensive care.⁶⁾ Following the positive effects of that success on patients, the effect on patient's quality of life started to be evaluated.⁸⁻¹⁰⁾

There are not many studies evaluating the effects of MvRp and MVR on the quality of life. In our study, we researched how the health related quality of life (HRQOL) of patients who underwent MvRp and MVR was affected till the sixth month of the postoperative period compared to the preoperative status.

Material and Method

Study design

Firstly, The university's ethics committee approved our prospectively designed study. Then patients were invited to outpatient control and volunteer patients were enrolled in the study by taking informed consent.

Study population

The study population comprised patients who underwent only mitral valve surgery in our center between the years 2011–2012. During this period, mitral valve operations were executed by one surgical team. Fifty-six patients who accepted to participate were enrolled in the study, provided that they had no neurologic, psychiatric and communicational problem and had the capacity for

reading and understanding Turkish. Twenty-four (42.8%) of these patients had undergone MVR while 32 (57.1%) of them had undergone MvRp. Patients with ischemic mitral regurgitation and those who had supplementary cardiac intervention or a <45% preoperative ejection fraction (EF) were not included in the study. Similarly, patients who had second degree or higher mitral regurgitation or moderate-to-severe mitral stenosis, according to the postoperative and final control echocardiography, were not included in the study.

Data collection

Patients' demographic information and preoperative echocardiographic results were recorded (**Table 1**). The health-related quality of life was evaluated with the SF-36 quality of life questionnaires, which were filled by the patients before the operation and six months later. Clinical and echocardiographic results in the sixth month of the postoperative period were also analyzed.

SF-36 quality of life questionnaire

The Short-Form (Short-Form Health Survey, SF-36), which provides generic, in-depth measures, was developed in 1992 by the Rand Corporation, and then it was started to be used.¹¹⁾ Koçyiğit executed the first Turkish validity and reliability study for SF-36 in 1999, which indicated that Cronbach's Alpha coefficient was over 0.70.¹²⁾ SF-36 includes articles related to change perceptions in health status within the last four weeks. The questionnaire consists of 36 articles: physical and mental components including 8 sub-scales. These subscales include PF, RP, BP, GH, VT, SF, RE and MH. Each scale is directly transformed into a 0–100 scale, and the lowest point shows the worst health status. SF-36 has two main components: the physical component summary (PCS) and mental component summary (MCS). The physical component summary includes PF, RP, BP and GH while the mental component summary includes VT, SF, RE and MH subscales. The PCS and MCS are standardized to reflect the general population with a mean of 50 and an SD of 10.¹¹⁾

Statistical method

For all the analyses, we applied the SPSS 20.0 program. In the supplementary data statistics, we used mean, standard deviation, proportion and frequency values. The data distribution was evaluated by using the Kolmogorov Simirnov test. An independent sample t test and Mann-Whitney U test were applied for analyzing the

Table 1 Demographic and perioperative parameters

| Parameters | MvRp (n = 32) | MVR (n = 24) | p |
|-------------------------------------------|------------------|-----------------|--------|
| Age, years, mean \pm SD | 53.7 \pm 15.2 | 51.2 \pm 17.6 | 0.7 |
| Gender, n (%) | | | |
| Male | 43.7 (14) | 45.8 (11) | 0.9 |
| Female | 56.2 (18) | 54.1 (13) | |
| NYHA class, % (n) | | | |
| I ve II | 43.7 (14) | 33.3 (8) | 0.6 |
| III ve IV | 56.2 (18) | 66.6 (16) | |
| Pathology,* % (n) | | | |
| Mitral regurgitation | 71.8 (23) | 37.5 (9) | 0.01 |
| Mitral stenosis | 28.1 (9) | 62.5 (15) | |
| Etiology, % (n) | | | |
| Rheumatic | 31.2 (10) | 62.5 (15) | 0.03 |
| Degenerative | 68.7 (22) | 37.5 (9) | |
| Hypertension | 34.8 (11) | 20.8 (5) | 0.37 |
| Chronic Obstructive Pulmonary Disease | 9.4 (3) | 25 (6) | 0.15 |
| Diabetes mellitus | 9.4 (3) | 16.7 (4) | 0.45 |
| Rhythm, % (n) | | | |
| SR | 62.5 (20) | 37.5 (9) | 0.06 |
| AFR | 37.5 (12) | 62.5 (15) | |
| Echocardiographic data, mean \pm SS | | | |
| EF, mean \pm SS | 59 \pm 11.2 | 54 \pm 13.4 | 0.2 |
| LVESD, mean \pm SS | 3.8 \pm 0.6 | 3.7 \pm 0.7 | 0.5 |
| LA, * mean \pm SS | 4.3 \pm 0.8 | 4.8 \pm 0.9 | 0.04 |
| Cross-clamp time,* minute, mean \pm SS | 109.2 \pm 19.5 | 79.7 \pm 15.4 | <0.001 |
| Total bypass time,* minute, mean \pm SS | 132.4 \pm 21.7 | 102.1 \pm 0.1 | <0.001 |

Data are presented as mean \pm SD and percentage (number). AFR: atrial fibrillation rhythm; EF: ejection fraction; LA: left atrium; LVESD: left ventricular end-systolic diameter; MS: mitral stenosis; MR: mitral regurgitation; NYHA: New York Heart Association; SR: sinus rhythm *p <0.05 statistically significant

quantitative data. For repeated measurements, we used the paired sample t test and Wilcoxon test. As for qualitative data, we exercised Chi-Square and Fisher's Exact tests. Significance was measured as $p < 0.05$.

Results

Preoperative and per-operative results

Thirty-one (55.3%) of 56 patients were female, and the mean age of patients in the MvRp group was 53.7 ± 15.2 , the mean age of those in the MVR group was 51.2 ± 17.6 , and both groups were similar ($p = 0.7$). In patients who had MvRp, the pathology mainly showed insufficiency, and the etiology was mostly degenerative. As to MVR patients, the pathology was generally stenosis, and the etiology was mostly rheumatic. There was a significant difference between the two groups regarding pathology and etiology (respectively $p = 0.006$; $p = 0.03$). The mean caliber of atrium was higher in the replacement group ($p = 0.04$). There were no significant differences between the groups in the sense of other pre-

operative properties (**Table 1**). Cross-clamp and cardiopulmonary bypass durations were longer for mitral repair patients (respectively $p < 0.001$, $p < 0.001$), while controls executed in the sixth month of the postoperative period suggested that there was a significant recovery in the functional capacities of both groups, and compared with the preoperative period ($p < 0.01$, for both groups), it was ascertained that the recovery in functional capacities does not significantly differ between the groups ($p > 0.05$).

Change in the quality of life

For the evaluation of patients' quality of life, we used the SF-36 quality of life questionnaire. After we had applied SF-36 before and after the operation, we evaluated both the intra and intergroup significance of the change (**Table 2**). The intragroup comparison of pre and postoperative changes for each of the 8 subscales forming SF-36 indicated that the quality of life significantly recovered ($p < 0.05$) in all the subscales of the both groups except for RE ($p = 0.097$) of the MVR group. According to the intergroup comparison of pre and

Table 2 Comparison of changes in quality of life with Short-Form 36

| SF-36 Parameters | | MvRp | MVR | p ^b |
|------------------|---------------------|--------------|--------------|----------------|
| | | mean ± SD | mean ± SD | |
| PF | Preop | 58.6 ± 7.6 | 54.3 ± 5.1 | 0.022 |
| | Postop | 74.4 ± 7.0 | 66.0 ± 3.9 | 0.000 |
| | Postop/Preop Change | 15.9 ± 5.5 | 11.7 ± 5.8 | 0.008 |
| | p ^a | 0.000 | 0.000 | |
| RP | Preop | 39.8 ± 9.9 | 32.0 ± 5.2 | 0.001 |
| | Postop | 73.0 ± 5.3 | 60.0 ± 5.5 | 0.000 |
| | Postop/Preop Change | 33.2 ± 12.1 | 28.1 ± 9.8 | 0.097 |
| | p ^a | 0.000 | 0.000 | |
| BP | Preop | 48.5 ± 5.4 | 54.0 ± 1.9 | 0.000 |
| | Postop | 51.9 ± 5.2 | 55.2 ± 2.5 | 0.003 |
| | Postop/Preop Change | 3.4 ± 4.7 | 1.2 ± 2.2 | 0.025 |
| | p ^a | 0.000 | 0.000 | |
| GH | Preop | 36.8 ± 6.4 | 37.7 ± 4.2 | 0.524 |
| | Postop | 77.1 ± 6.0 | 56.3 ± 3.5 | 0.000 |
| | Postop/Preop Change | 40.3 ± 6.5 | 18.7 ± 6.4 | 0.000 |
| | p ^a | 0.000 | 0.000 | |
| VT | Preop | 44.4 ± 4.2 | 39.1 ± 9.3 | 0.006 |
| | Postop | 68.2 ± 6.3 | 53.4 ± 6.3 | 0.000 |
| | Postop/Preop Change | 23.8 ± 8.2 | 14.3 ± 8.5 | 0.000 |
| | p ^a | 0.000 | 0.000 | |
| SF | Preop | 67.3 ± 4.6 | 57.0 ± 7.9 | 0.000 |
| | Postop | 75.8 ± 5.3 | 62.3 ± 6.2 | 0.000 |
| | Postop/Preop Change | 8.5 ± 5.9 | 5.2 ± 9.1 | 0.105 |
| | p ^a | 0.000 | 0.010 | |
| RE | Preop | 40.1 ± 10.8 | 42.7 ± 9.6 | 0.321 |
| | Postop | 58.9 ± 11.9 | 48.8 ± 12.8 | 0.003 |
| | Postop/Preop Change | 18.8 ± 15.0 | 6.2 ± 19.2 | 0.012 |
| | p ^a | 0.000 | 0.097 | |
| MH | Preop | 62.2 ± 6.1 | 58.5 ± 4.7 | 0.019 |
| | Postop | 73.3 ± 3.4 | 64.3 ± 4.6 | 0.000 |
| | Postop/Preop Change | 11.2 ± 6.0 | 5.8 ± 3.3 | 0.000 |
| | p ^a | 0.000 | 0.000 | |

Data are presented mean ± standart deviation. BP: bodily pain; GH: general health; MH: mental health; MvRp: mitral valve repair; MVR: mitral valve replacement; PF: physical functioning; RE: role-emotional; RP: role-physical; SF: social functioning; VT: vitality p^a: comparison of intra-group preoperative and postoperative data, p^b: comparison of inter-group preoperative and postoperative data

postoperative changes, there was no significant difference between the two groups only in terms of RP and SF (respectively $p = 0.097$, $p = 0.105$). However, the inter-group comparison of the pre and postoperative changes showed that the change between PF, BP, GH, VT, RE and MH values were significantly higher in the MvRp group than in those of the MVR group (respectively; $p < 0.01$, $p < 0.05$, $p < 0.01$, $p < 0.01$, $p < 0.05$ and $p < 0.01$) (**Fig. 1**).

Summary of physical and mental components

In both groups, the comparison of pre and postoperative values of all subscales according to the mean normal values of Turkish society are indicated in **Fig. 2**. For con-

verting the raw score scale for patients into the 10 standard deviation and 50 mean, we applied linear transformation considering the mean normal values of Turkish society. After that transformation in MvRp patients, PCS was 49.1, and MCS was 48.3 while in MVR patients, PCS was 43.9, and MCS was 41.6.

Risk factors affecting the quality of life

Preoperative risk factors affecting the PCS and MCS, two main components of SF-36 quality of life measures, were analyzed for all the patients ($n = 56$). After the independent sample t test had been applied, it was found that the use of the MVR method for the mitral valve

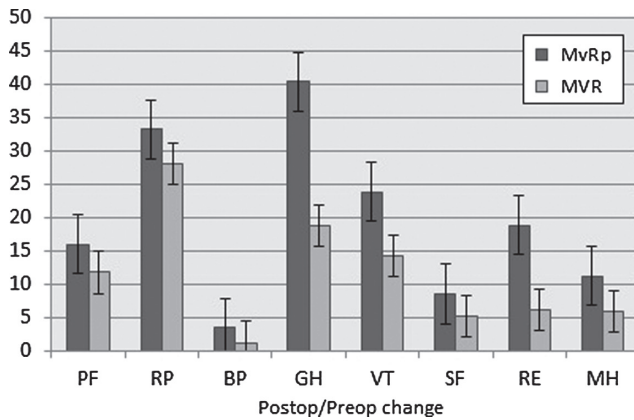


Fig. 1 Intergroup comparison of pre and postoperative changes for each of the 8 subscales forming Short Form-36. PF: physical functioning; RP: role-physical; BP: bodily pain; GH: general health; VT: vitality; SF: social functioning; RE: role-emotional; MH: mental health; MvRp: mitral valve repair; MVR: mitral valve replacement.

operation negatively affected pre and postoperative changes in the PCS ($p = 0.015$) while AFR and female gender negatively affected pre and postoperative changes in the MCS (respectively $p = 0.003$, $p = 0.033$) (**Table 3**). However, we think that not having a significant difference between the two groups regarding these risk factors does not negatively affect the results of our quality of life questionnaire.

Discussion

It is known that mitral repair, which has been applied more often in the recent years due to the standardization of mitral repair techniques and the increase in the surgical experience, is better than MVR because it provides better protection for ventricular functions and protects against complications arising from the use of a mechanical valve and an anticoagulant.^{13,14} The avoidance of these complications, better protected ventricular functions and not having the mechanical valve sound, all refer to the expectation of better quality of life.

There are a number of studies regarding the quality of life after mitral valve surgery. In Turkey, MvRp has been applied more frequently in various centers compared to previous years. In many studies, it has been stated that valve repair has advantages. Some studies have shown that MvRp reduces myocardial failure and/or mortality related to the early or late complications of prosthesis valve. The reason why mortality occurs less frequently after MvRp is that emboli and/or anticoagulant-related

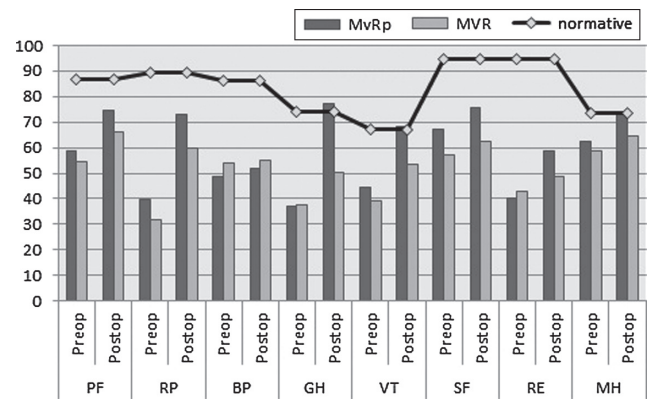


Fig. 2 The comparison of preoperative and postoperative values of all subscales of SF-36 quality of life measures according to the mean norm values of Turkish society. PF: physical functioning; RP: role-physical; BP: bodily pain; GH: general health; VT: vitality; SF: social functioning; RE: role-emotional; MH: mental health; MvRp: mitral valve repair; MVR: mitral valve replacement.

bleeding is low in the repair group.¹⁵ Five-year-survival rates of degenerative mitral valve patients are given for repair and replacement patients as 84.3% and 64.6% respectively.⁶

Many studies have showed that repair is better than replacement in terms of operative mortality, morbidity, survival, endocarditis and thromboembolic complications.^{13,14} Although the reoperation ratios are suggested to be similar, there are studies referring to high reoperation ratios in the ischemic mitral regurgitation.⁷ None of our patients needed reoperation within the six-month follow-up. In a cost-analysis study, it is suggested that repair can be the first choice with its lower cost comparing to the replacement applied with mechanical or biological valve.⁵

Applying CABG at the same time with mitral valve surgery increases mortality and rehospitalization rates.¹⁶ Advanced age, a low EF, the having of a preoperative rate left ventricular end systolic diameter (LVESD) >45 mm and ischemic MR are indicators of poor prognosis in mitral valve surgery.¹⁰ In our study, the patients whose mean age was <60, mean EF >40% and LVESD <45 mm, those with ischemic MR or having undergone concomitant CABG were not included in the study.

Generally, the success of surgical operations is measured by survival, mortality, morbidity, complications, symptoms, recurrence and the need for reoperation. The fact that valve operations have been done with success proved that the quality of life should be considered in the selection of the operation type.

Table 3 Risk factors of changes in quality of life

| | | Postop/Preop MCS | | change | p* | Postop/Preop PCS | | change | p* |
|------------------|--------|------------------|-------|------------------|--------------|------------------|-------|------------------|--------------|
| | | Min. | Max. | mean \pm SD | | Min. | Max. | mean \pm SD | |
| Procedure | MVR | -7.30 | 7.90 | 1.88 \pm 3.92 | 0.133 | -10.80 | 7.00 | -2.46 \pm 3.66 | 0.015 |
| | MvRp | -5.10 | 12.90 | 3.58 \pm 4.30 | | -6.20 | 6.00 | -0.02 \pm 3.52 | |
| Gender | Female | -6.60 | 5.00 | -0.11 \pm 2.96 | 0.033 | -5.30 | 9.50 | 3.20 \pm 3.63 | 0.499 |
| | Male | -10.80 | 7.00 | -2.25 \pm 4.32 | | -7.30 | 12.90 | 2.42 \pm 4.84 | |
| Rhythm | AFR | -5.10 | 12.9 | -2.9 \pm 5.9 | 0.003 | -7.30 | 9.50 | 2.51 \pm 4.12 | 0.510 |
| | SR | -7.3 | 7.9 | 1.8 \pm 5.2 | | -5.10 | 12.90 | 3.20 \pm 4.31 | |

Data are presented as minimum, maximum and mean \pm SD (standard deviation). AFR: atrial fibrillation rhythm; MCS: mental component summary; MvRp: mitral valve repair; MVR: mitral valve replacement; PCS: physical component summary; SR: sinus rhythm *independent sample t test

Jokinen, et al.⁹⁾ suggest that within the 7- years follow up period, the survival rate is better in the MvRp group. However, while the complication development and reoperation requirement are similar in both groups, there is not a significant difference between repair and replacement groups in terms of HRQOL.⁹⁾ While Goldsmith, et al.¹⁰⁾ suggest that the quality of life is superior in patients who have had mitral repair, Sedkaryan, et al.⁸⁾ have reported that, according to 18 months of follow-up, there is no significant difference between the groups regarding HRQOL parameters, except for social functioning. In our study, we evaluated the HRQOL of mitral valve patients within 6 months follow-up, and while doing that, we took Turkish norms into consideration. When the pre and postoperative changes were compared between groups, 6 subscales of SF-36 quality of life measures, except for RF and SF, were found to be significantly higher in patients who had mitral repair. However, it was observed that HRQOL had increased in both groups, compared to preoperative conditions.

Comparing the pre and postoperative periods, our study found a meaningful increase in all parameters of SF 36 which measures HRQOL in patients who underwent both MvRp and MVR. However, in the pre-operative period, SF 36 parameters were found generally higher in the MvRp group compared with the MVR group. Therefore, for objective HRQOL evaluation purposes, intra-group % of change was calculated pre- and post-operatively and the change was compared between the groups. Doing this eliminated the potential problems that could be caused by the higher pre-operative SF 36 parameter score in the MvRp group.

In this present study, we consider that the higher pre-operative SF 36 parameter score in the MvRp group could be associated with the typical pathology of degenerative mitral stenosis (68.7 vs. 37.5%; $p = 0.03$), lower

AFR incidence although statistically insignificant (37.5% vs. 62.5%; $p = 0.06$), fewer number of NYHA class III-IV patients (56.2% vs. 66.6%; $p = 0.6$), and lower COPD incidence (9.4% vs. 25%; $p = 0.15$).

Limitation of the Study

There are two limitations that need to be acknowledged regarding the present study. The first limitation concerned the concentric characteristic of the study, and the second limitation was that the study was not randomized.

Conclusion

Results of the quality of life measures showed that, compared to the preoperative period, there was a significant recovery in the quality of life in both MvRp and mitral valve components that have a more significant recovery in patients who had undergone MvRp. It should be considered that the planned surgical treatment method for mitral valve patients can affect the patient's quality of life and this effect can be a success indicator for surgical treatment.

Disclosure Statement

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