

ORIGINAL ARTICLE

FREQUENCY OF ACUTE MITRAL REGURGITATION IN POST PERCUTANEOUS TRANSVENOUS MITRAL COMMISSUROTOMY PATIENTS WITH SEVERE MITRAL STENOSIS

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Objectives: To determine the frequency of Acute Mitral Regurgitation in Post Percutaneous Transvenous Mitral Commissurotomy (PTMC) patients with severe mitral stenosis (MS).

Methodology: A cross-sectional study was conducted at the Tabba Heart Institute, Karachi, Pakistan between September 2019 and April 2021. All patients irrespective of gender, aged between 19-80 years, and those who did not undergo PTMC were eligible to partake in the study. Patients with mitral regurgitation along with mitral stenosis, or those with clot in left atrium, or those suffering with the last stage of renal disease were excluded from the study. A predefined Proforma was used as a research instrument through which medical records of patients of PTMC are collected. The variables of the Proforma include patient's age, name, sex, echo findings, treatment procedure, post-procedure data and complications.

Results: A mean age of 40.6 ± 12.63 years was reported. 86 (81.9%) of the patients developed 'no complications', 15 (14.3%) of the PTMC patients suffered from 'severe mitral regurgitation', 2 (1.9%) had local hematoma, and one patient had a cardiac tamponade after the procedure. Only one patient died post-procedure. Post-stratification analysis showed that the majority of the female patients and 83% of the patients with no previous commissurotomy history did not have any complications. While a total of 14.7% who had no history of previous commissurotomy suffered from severe MR.

Conclusion: Our study revealed that only a small number of patients who underwent PTMC suffered from severe mitral regurgitation. Overall, the procedure is safe with a good outcome.

Keywords: Post Percutaneous Transvenous Mitral Commissurotomy, PTMC, Mitral Regurgitation, MR, Cardiac Tamponade, Local Site complications

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INTRODUCTION

Rheumatic heart disease occurs as a result of the valvular damage that is accountable for increasing the mortality and morbidity rates in many of the developing as well as the developed countries.¹ Pakistan is categorized as a third world country with high frequency of the RHD. The most common cause of the RHD is mitral stenosis.² However, there are only about 50-70% of the patients that present with the history of RHD. It is one of the major health problems within the developing nations of the world.³

Percutaneous transvenous mitral commissurotomy (PTMC) has been viewed as a nonsurgical commissurotomy in patients that are suffering from the hemodynamic mitral stenosis.⁴⁻⁵ The procedure of the PTMC is significantly cost effective and much less invasive as compared to the surgical complications with very little chance of the pericardial tamponade.⁶ However, the procedure is associated with a myriad of complications and the literature has been inconsistent

with multiple studies reporting different short and long term outcomes associated with PTMC.⁷⁻⁸

With experience, the success rate of the PTMC procedure has remarkably increased with a decrease in the post complications ratio.⁶ Nevertheless, a major complication that is still associated with the PTMC is the high tendency of the patients to develop a mild to moderate mitral regurgitation which is tolerable in 25 - 83% of the patients.⁹ However, the research has estimated that about 1.4 -7.5% of the patients present with the symptoms of acute mitral regurgitation as a post PTMC procedural outcome.⁹⁻¹⁰

As there is a dearth of research studies available in the developing countries with respect to the frequency of occurrence of the acute mitral regurgitation within the patients who have had the Percutaneous Transvenous Mitral Commissurotomy procedure suffering from severe mitral stenosis in the past, the current study was conducted. The primary aim of this research study was to analyze the frequency of the occurrence of the

Acute Mitral Regurgitation in patients that have undergone the Post Percutaneous Transvenous Mitral Commissurotomy because of suffering from severe mitral stenosis.

METHODOLOGY

A cross-sectional study was conducted at the Tabba Heart Institute, between September 2019 and April 2021. The study was initiated after securing ethical approval from the IRB, NICVD (Reference # 21322). Informed consent was obtained from all patients prior to the data acquisition. Consecutive patients aged between 19-80 years, irrespective of gender, smoking status, diagnosed cases of Diabetes Mellitus on treatment for the last 1 year, diagnosed cases of hypertension taking medication for at least 1 year, those who did not undergo PTMC were eligible to partake in the study. Patients with mitral regurgitation along with mitral stenosis, or those with clot in left atrium, or those suffering with the last stage of renal disease were excluded from the study.

In this study, a predefined Proforma was used as a research instrument through which medical records of patients of PTMC was collected. The variables of the Proforma include patient’s age, gender, echo findings, treatment procedure, post-procedure data and complications. Pre-and post-procedure mitral regurgitation was analyzed by transthoracic echocardiogram (TTE) by a technician with an experience of over 5 years.

The data was analyzed with IBM SPSS (statistical package for social sciences software) 23 version. All continuous data was presented as mean and standard deviation including age, height, weight, body mass index, etc. All categorical data were presented as frequency and percentages such as gender, age groups, previous commissurotomy, etc. Stratification was done with respect to gender, previous commissurotomy, age groups, and NYHA classification and its relationship was sought with post-procedure complications.

RESULTS

A mean age of patients 40.6 ± 12.63 years was observed. The majority of the PTMC patients were females i.e., four-fifth of the total research participants. It was shown that the majority of the PTMC patients had ‘Trace’ MR, which is a very mild leak of a heart valve. The percentage of patients with Trace MR before the procedure was 37 (35.2%), followed by patients with Mild MR 34 (32.4%). Twelve (11.4%) patients did not have any MR related issues, 8 (7.7%) had moderate, while 6 (5.7%) had

mild-moderate MR before the procedure (Table 1 and 2).

Table 1: Descriptive statistics of Study Participants (n=105)

Parameters	Mean	Standard Deviation
Age	40.61	12.63
Height	155.79	8.54
Weight	61.47	14.72
Body Mass Index	25.17	5.44
Pre-procedure Parameters		
Reference Balloon size	25.62	0.96
Mitral valve area (Pre-procedure)	0.9	0.21
Mean pressure gradient (MG)	12.58	4.52
Peak pressure gradient (PG)	20.49	6.36
Peri- & Post-procedure Parameters		
Balloon size used in procedure	26.41	0.9
Balloon max inflated up to	25.92	1.4
Mitral valve area (post procedure)	1.65	0.25
Mean pressure gradient (post procedure)	5.48	1.79
Peak pressure gradient (post procedure)	12.69	4.03

Table 2: Characteristics of Participants in the Study (n=105)

Variable	Frequency	%
Gender		
Male	20	19
Female	85	81
Age Groups		
≤ 30	25	23.8
31- 40	32	30.5
41 - 50	25	23.8
51 - 60	16	15.2
61 - 70	6	5.7
71 - 80	1	1
Previous Commissurotomy		
Yes	10	9.5
No	95	90.5
New York health association (NYHA) Class		
II	9	8.6
III	89	84.8
IV	7	6.7
Mitral regurgitation (MR)		

Mild	34	32.4
Mild-Moderate	6	5.7
Moderate	8	7.7
Moderate-Severe	4	3.9
Severe	2	1.9
Trace	37	35.2
No Regurgitation	2	1.9
No Mitral valve related issue	12	11.4

A total of 86 (81.9%) patients developed ‘no complications’, 15 (14.3%) of the PTMC patients suffered from ‘severe MR’, 2 (1.9%) had local hematoma, and one patient had a cardiac tamponade after the procedure. Only one patient died post-procedure.

Post-stratification analysis showed that the majority of the female patients and 83% of the patients with no previous commissurotomy history did not have any complications. While a total of 14.7% who had no history of previous commissurotomy suffered from severe MR (Table 3).

According to the cross-tabulation table, in the age groups ≤ 30, 61-70, 71-80, more patients suffered from severe MR after the procedure than expected, suggesting a relationship between extreme age groups and Severe MR. There was no significant relationship between the balloon size and complication rates post-procedure.

Table 1: Comparison of measured (24 h) and estimated sodium

Variables	Cardiac Tamponade	Local Site Hematoma	Severe Mitral Regurgitation	No Complication	Death
Gender					
Male	0	2	4	14	0
Female	1	0	11	72	1
Previous Commissurotomy					
Yes	0	1	1	7	1
No	1	1	14	79	0
Age Groups					
≤ 30.00	1	0	5	19	0
31.00 - 40.00	0	2	2	28	0
41.00 - 50.00	0	0	2	23	0
51.00 - 60.00	0	0	2	13	1
61.00 - 70.00	0	0	3	3	0
71.00 - 80.00	0	0	1	0	0
NYHA Class					
Class I	0	0	0	0	0
Class II	1	0	0	8	0
Class III	0	2	13	74	0
Class IV	0	0	2	4	1

DISCUSSION

The detailed quantitative analysis reveals a number of key facts related to acute mitral regurgitation (MR) in PTMC patients. According to the results of the study, the majority of the patients were female (81%) within the age group 31-40 years (30.5%). The post-procedure statistics revealed that the average balloon size used in the procedure was equal to 26.41 cm³, which was greater than the average size to be used (25.62 cm³). The Majority of the patients did not suffer from any complication after the procedure while, the most common complication was mitral regurgitation.

Some other complications observed in the study were local site hematoma, cardiac tamponade, and death. The results also reveal that proportionately more males than females suffered from ‘severe MR’ after the procedure. Severe mitral regurgitation after the procedure was more common in the elderly population, suggesting a relationship between extreme age groups and Severe MR. The findings of the current study are in accordance with the published literature.¹¹⁻¹²

A study by Kothari et al., revealed that PTMC is a safe procedure that can be performed without any raised

risk for complications; however, the restenosis was more commonly reported in patients who were diagnosed with severe mitral stenosis as compared to the control group.¹³ Kubota et al., reported that PTMC has a favorable prognosis in the long-term with a 20-year survival rate of 71%. It was advocated that those who had poor short-term response to the surgery should be observed vigilantly as they have a worse survival rate than those who have good immediate outcomes after PTMC.¹⁴ In another study by Bhardwaj et al., quality of life of patients with MS was evaluated pre- and post-PTMC. It was observed that PTMC was not only a safe and effective procedure but also improved the QOL of patients significantly thus highlighting the importance of this procedure being offered at an earlier stage of the disease.¹⁵

A local study conducted in 2019 at the Combined Military Hospital, Pakistan reported that no complications like localized hematoma, mitral regurgitation, or circulatory compromise were observed by the authors after PTMC. The success rate of PTMC among the patients (mean age of 40.3 ± 2.8) was excellent.¹⁶

Based on the current analysis and previously published literature, it can be concluded that there is a high success rate of the PTMC procedure in patients with severe mitral stenosis.¹⁷⁻¹⁸ Certain studies suggest that maintenance of mean valvular area and mitral valve mean gradient pressure can be associated with increased risk of mitral regurgitation after surgery.^{12,19}

There were several limitations in the study. Firstly, the patients failed to maintain a long-term follow-up therefore, only the short-term procedural complications were identified. Secondly, due to the fact that it was a single centered study, the sample population was undiversified thus, we cannot expand our findings to a larger population. Further large-scale studies involving a diversified subset of population should be planned.

CONCLUSION

Our study revealed that only a small number of patients who underwent PTMC suffered from severe mitral regurgitation. Overall, the procedure is safe with a good outcome. It is recommended that a multiethnic, multi center, and multi city study should be conducted in Pakistan in order to explore the genetic and environmental as well as hospital-related factors related to post procedural complications in patients with severe mitral regurgitation who underwent PTMC.

AUTHORS' CONTRIBUTION:

IA: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. HS, AHK: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

Conflict of interest: Authors declared no conflict of interest.

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