

OUTCOMES OF PERCUTANEOUS TRANSVENOUS MITRAL COMMISSUROTOMY IN RHEUMATIC MITRAL STENOSIS AT 1 YEAR FOLLOW-UP AT NATIONAL INSTITUTE OF CARDIOVASCULAR DISEASES

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ABSTRACT

Objectives: To evaluate one year clinical outcomes of percutaneous transvenous mitral commissurotomy (PTMC) in patients with rheumatic mitral stenosis, with particular emphasis on the need for redo PTMC and to determine frequency of mitral regurgitation, incidence of stroke, and symptom recurrence at 1 year follow up and assess the overall success and safety of PTMC at 1 year.

Study Design: Prospective cohort study.

Place and Duration of Study: National Institute of Cardiovascular Diseases, Karachi from 1st January 2024 to 30th September 2024.

Methodology: A total of 196 patients with rheumatic mitral stenosis undergoing PTMC were enrolled using consecutive sampling and followed for one year. Successful PTMC was defined as >50% increase in mitral valve area, no or mild mitral regurgitation (MR), and symptomatic improvement. Data were analyzed using descriptive statistics and inferential analyses. Wilcoxon signed-rank and Stuart-Maxwell tests were used to compare paired continuous and categorical variables, respectively. Exploratory univariate logistic regression analyses were performed to identify factors associated with redo PTMC and symptom recurrence.

Results: The mean age of patients was 38.36±10.93 years, with a female pre-eminence (75.5%). At one-year follow-up, redo PTMC was required in 22 (11.2%) patients. Mitral regurgitation occurred in 29 (14.8%) patients, stroke in 2 (1.0%), and symptom recurrence in 47 (24.0%) patients. Non-compliance with medications was significantly associated with both redo PTMC (OR 10.32, 95% CI 3.75-28.39; p<0.001) and symptom recurrence (OR 59.37, 95% CI 13.13-268.51; p<0.001).

Conclusion: Percutaneous transvenous mitral commissurotomy remains a reliable treatment for rheumatic mitral stenosis. However, the need for redo percutaneous transvenous mitral commissurotomy in a notable proportion of patients highlights the importance of long-term follow-up and careful patient selection.

KEYWORDS: Percutaneous transvenous mitral commissurotomy, Mitral regurgitation, Rheumatic mitral stenosis, Outcomes.

INTRODUCTION

Rheumatic heart disease remains a devastating health issue in developing countries, particularly in South Asia.¹ Rheumatic mitral stenosis is one of its most common manifestations and contributes significantly to morbidity and reduced quality of life.² Percutaneous transvenous mitral commissurotomy (PTMC) has emerged as the intervention of choice for suitable patients with rheumatic mitral stenosis due to its minimally invasive nature and favorable outcomes.³ It provides symptomatic relief and improves hemodynamic parameters without the need for open-heart surgery.

Despite its established efficacy, concerns remain regarding long-term durability and the incidence of complications such as mitral regurgitation, restenosis, and the need for repeat intervention.⁴ Limited local data exist regarding one-year outcomes following PTMC, particularly focusing on redo procedures.⁵

The main goal of the study is to assess the one-year outcomes of PTMC in a tertiary care setting, with special emphasis on the frequency of redo PTMC.

MATERIALS AND METHODS

This prospective cohort study was done at the National Institute of Cardiovascular Diseases. Patients were enrolled from 1st January 2024 to 30th September 2024 and followed for one year for individual patients such that patient who underwent PTMC from 1st January 2024 was followed till 31st January 2025 vide letter No. IRB-99/2025; Dated 23rd September 2025. Patients were followed through regular OPD visits and phone calls, identity of patients were kept hidden and patients were

identified using hospital medical record number and patients enrolled with informed consent. A total of 196 patients diagnosed with rheumatic mitral stenosis undergoing PTMC were included through consecutive sampling. Patients with rheumatic mitral stenosis undergoing PTMC irrespective of Wilkins score, provided they were considered suitable candidates for intervention by the treating heart team after comprehensive clinical and echocardiographic assessment as no left atrial thrombus on echocardiography and no more than a mild MR at baseline were included. The patients who have moderate to severe mitral regurgitation, left atrial thrombus, severely calcified mitral valve and concomitant other valvular lesions requiring surgical intervention were excluded.

Successful PTMC

- Post procedural mitral valve area (MVA) $\geq 1.5 \text{ cm}^2$ or $\geq 50\%$ increase from baseline.⁶
- No more than moderate mitral regurgitation (MR $\leq$ Grade 2)
- Absence of major procedural complications including death, stroke, pericardial effusion, or need for emergent mitral valve surgery.

Adverse Outcomes

- Mitral regurgitation⁸
- Stroke
- Symptom recurrence
- Need for redo PTMC

Mitral regurgitation severity was assessed by transthoracic echocardiography according to standard criteria and graded as⁷:

- No MR
- Mild MR = Grade 1
- Moderate MR = Grade 2
- Moderate to Severe MR = Grade 3
- Severe MR = Grade 4

Restenosis was defined as a mitral valve area $<1.5 \text{ cm}^2$ or loss of $\geq 50\%$ of the prior increase in mitral valve area following PTMC, accompanied by recurrence of symptoms.

Symptom recurrence was defined as recurrence of dyspnoea corresponding to NYHA functional class I-IV after initial post-procedural improvement.

Data were collected using a structured proforma and patients were followed for one year. The data was entered and analyzed through SPSS-25. Wilcoxon signed-rank and Stuart-Maxwell tests were used for paired continuous and categorical variables, respectively. Exploratory univariate logistic regression was performed to assess factors associated with redo PTMC and symptom recurrence, and results were reported as odds ratios (ORs) with 95% confidence intervals (CIs). Multivariable regression and stroke predictor analysis were not performed because of the limited number of events.

RESULTS

There were 148 (75.5%) were female and 48 (24.5%) were male (Table 1). Baseline echocardiographic parameters improved significantly following PTMC and remained sustained at one-year follow-up. Mean mitral valve area inclined from $0.89 \pm 0.24 \text{ cm}^2$ at baseline to $1.71 \pm 0.48 \text{ cm}^2$ immediately post-procedure and $1.66 \pm 0.42 \text{ cm}^2$ at one year, while mean transmitral gradient decline from $16.4 \pm 4.8 \text{ mmHg}$ to $4.6 \pm 1.8 \text{ mmHg}$ and $4.9 \pm 2.4 \text{ mmHg}$, respectively ($p < 0.001$ for all comparisons) (Table 2). At one-year follow-up, 149 (76%) patients remained symptom free and 47 (24%) experienced recurrent dyspnoea. Electrical instability was present in 92 (46.9%) patients, including atrial fibrillation in 86 (43.9%) and atrial flutter in 6 (3.1%). Redo PTMC was required in 22 (11.2%) patients, mitral regurgitation occurred in 29 (14.8%), and stroke occurred in 2 (1%) patients (Table 3). The distribution of mitral regurgitation severity did not change significantly between the immediate post-procedural period and one-year follow-up ($p = 0.093$) (Table 4).

Exploratory univariate logistic regression analyses demonstrated that post-procedural medication non-compliance was significantly associated with redo PTMC (OR 10.32, 95% CI 3.75–28.39; $p < 0.001$) and symptom recurrence (OR 59.37, 95% CI 13.13–268.51; $p < 0.001$), whereas female sex and electrical instability were not significant predictors (Tables 5-6). Two patients developed in-hospital ischemic stroke; both had pre-existing atrial fibrillation and suboptimal anticoagulation.

Table 1: Baseline characteristics (n=196)

Variable	Value
Gender	
Male	48 (24.5%)
Female	148 (75.5%)
Mean age (years)	38.36 ± 10.93
Electrical instability	92 (46.9%)
Atrial fibrillation	86 (43.9%)
Atrial flutter	6 (3.1%)
On anticoagulation	88/92 (95.7%)

Baseline Wilkin score < 8	19 (9.7%)
Baseline Wilkin score = 8	143 (73%)
Baseline Wilkin score > 8	34 (17.3%)

Table 2: Comparison of echocardiographic parameters

Variable	Pre-PTMC	Immediate post procedure	At 1 year follow-up	*p-value
Mitral valve area (cm ²)	0.89±0.24	1.71±0.48	1.66±0.42 cm ²	<0.001
Mean pressure gradient (mmHg)	16.4±4.8	4.6±1.8	4.9±2.4	<0.001

*p-values by Wilcoxon signed-rank test

Table 3: One year outcomes

Outcome	No.	%
Redo PTMC	22	11.2
Mitral Regurgitation	29	14.8
Stroke	2	1.0
Symptom Recurrence	47	24.0

Table 4: Post procedure MR severity (n=196)

MR Grade	Immediate	At 1 year
None	125 (63.8%)	136 (69.4%)
Mild	47 (24%)	34 (17.3%)
Moderate	22 (11.2%)	22 (11.2%)
Severe	2 (1%)	4 (2%)

Table 5: Predictors of redo PTMC

Variable	OR (95% CI)	p-value
Female sex	2.21 (0.62-7.82)	0.219
Electrical instability	0.64 (0.26-1.61)	0.343
Non-compliance	10.32 (3.75-28.39)	<0.001

Table 6: Predictor of symptom recurrence

Variable	OR (95% CI)	p-value
Female sex	0.70 (0.33-1.45)	0.334
Electrical instability	1.84 (0.95-3.58)	0.071
Non-compliance	59.37 (13.13-268.51)	<0.001

DISCUSSION

Percutaneous transvenous mitral commissurotomy remains the treatment of choice for eligible patients with rheumatic mitral stenosis.⁹ In the present study, PTMC resulted in remarkable and sustained enhancement asain mitral valve area and mean transmitral gradient at one-year follow-up (p<0.001), findings that are consistent with local and international studies demonstrating durable haemodynamic benefits after successful PTMC.¹⁰ A small decline in mitral valve area and slight increase in gradient at one year may reflect late restenosis in a minority of patients.

Mitral regurgitation severity remained largely unchanged during follow-up (p=0.093), with most patients remaining in the none or mild MR category.¹¹⁻¹³ Electrical instability was observed in 46.9% of patients, predominantly atrial fibrillation, which is common in advanced rheumatic mitral stenosis.¹²

Redo PTMC was required in 11.2% of patients, a rate comparable to that reported from resource-limited settings in Pakistan.¹⁴ Exploratory analyses demonstrated a strong association between post-procedural medication non-compliance and both symptom recurrence and redo PTMC. Although causality cannot be inferred because of the observational design, these results highlight the potential importance of adherence and long-term follow-up in optimizing short-term outcomes after PTMC.

LIMITATION

This was a single-centre study with a relatively short follow-up duration of one year. Pulmonary artery systolic pressure and left atrial dimensions were not systematically collected and therefore could not be analyzed. The small number of stroke events and quasi-complete separation of outcomes associated with non-compliance precluded multivariable regression modelling.

CONCLUSION

Percutaneous transvenous mitral commissurotomy resulted in commendable and persistent improvement in mitral valve area and mean transmitral gradient at one-year follow-up. Most patients remained free of severe symptoms and significant mitral regurgitation. Nevertheless, a subset of patients experienced symptom recurrence and required repeat intervention. Exploratory analyses demonstrated a strong association between post-procedural non-compliance and adverse outcomes. Long-term surveillance, careful patient selection, and strategies to improve treatment adherence may further optimize outcomes following percutaneous transvenous mitral commissurotomy.

Recommendations

- Longer follow-up studies are needed
- Comparative studies with surgical interventions

Conflict of interest: The authors declare no conflict of interest.

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