

PTMC IN PATIENTS WITH HIGH WILKIN'S SCORE

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Abstract: Valvular mitral stenosis is a common problem in Pakistan and other countries of the subcontinent. Severe symptomatic mitral stenosis requires either the replacement of the mitral valve surgically or by Percutaneous Transluminal Mitral Commissurotomy (PTMC). If the mitral valve is suitable anatomically that is with a low Wilkin's score then PTMC being less invasive is considered to be a more preferred option. **Objective:** This Study is conducted to determine the success rate of PTMC in patients having high Wilkin's scores. **Methods:** A total number of 94 patients with mitral stenosis planned for PTMC were included. Data regarding baseline patient characteristics such as age, gender, mitral valve area (MVA), Wilkin's score, transmitral valve pressure gradients, and status of mitral regurgitation were collected. Patients with high Wilkin's score and high surgical risk undergoing PTMC were assessed by echocardiography after PTMC to determine its success as MVA >1.5 cm² and up to 50% decrease in transmitral valve pressure gradients and no worsening of MR by no more than one grade. **Results:** The mean age of patients included in this study was 44.40±14.19 years. Mean pre-operative MVPG of patients was 29.17±4.41 and post-operative MVPG was 7.55±3.74. The mean pre-operative MVA of patients was 0.73±0.10 cm² and the mean post-operative MVA was 1.78±0.40 cm². There were 62 (65.96%) female and 32 (34.04%) male patients. The success of PTMC was achieved in 74 (78.72%). **Conclusion:** In the present study, we found a success rate of 78.7% in patients with a high Wilkin's score of > 8. The procedure in this group of patients has an acceptable complication rate.

Keywords: Percutaneous Transluminal Mitral Commissurotomy, Wilkin's Score, Mitral Valve, Mortality

Introduction

Valvular mitral stenosis is a common problem in Pakistan and other countries of the subcontinent, though in the Western World prevalence has declined significantly as a result of better hygiene (1). The prevalence of rheumatic fever in Pakistan is 14.6/900 population which is very high worldwide (2). The mitral valve is the most commonly affected. In about 40% of cases, other heart valves are also affected along with the mitral valve. In about 25% of patients, mitral valve alone is affected (3).

Mitral stenosis when severe and symptomatic, treatment is required both medically and also by either surgery or PTMC. In surgical therapy, the valve is replaced by a mechanical or bioprosthetic valve. PTMC is performed via a femoral vein under local anesthesia and is considerably less invasive than surgical MVR. Post-procedure morbidity is also considerably less with it. The only limitation of performing PTMC is the valve anatomy. An anatomically suitable valve has thin leaflets, is highly mobile, and calcification and thickness are minimal. Other parameters are subvalvular disease, presence of left atrial clot, and degree of mitral regurgitation. If these parameters are suitable, PTMC is preferred over surgical MVR (4). PTMC is a class I indication in patients with pliable mitral valve with severe symptomatic mitral stenosis (4, 5).

Valve anatomy and its sub-components are assessed by Tran's thoracic echocardiography (TTE) and Tran's esophageal echocardiography (TOE). Wilkin's score is derived comprising of 4 sub-components (thickness of

valve, mobility, calcification grade, and sub valvular disease), valve suitability for performing PTMC is based on this score. If the score is equal to or less than 8, the valve is considered anatomically suitable for PTMC. TOE is performed before the PTMC to see the LA clot and further assess MR if not appropriately assessed on TTE (6, 7).

Routinely PTMC is advised in patients having Wilkin's score equal to or less than (8). However, PTMC is now routinely being offered to patients having Wilkin's score more than (8). Studies have reported results regarding the success rate in these patients. A study by Alvarado-PérezGS and Palacios-Rodríguez JM reported a success rate of 59.9% in patients having Wilkin's score ≥9.8 while a study conducted by Mughal et al. reported a success rate of 86.2% in patients having Wilkin's score ≥9.9 the present study aims to determine the success rate in patients undergoing PTMC having Wilkin's score ≥9. The study is important because only limited data is published in Pakistan regarding the success rate of PTMC in patients with high Wilkin scores. So the results of this study will help able to know whether PTMC has an acceptable success rate in these patients and will help us to decide whether we should continue to do PTMC in these patients or we should consider other options of mitral valve treatment if the success rate is found to be low. The objective of the study was to determine the frequency of successful PTMC in patients having high Wilkin scores.

Methodology

After getting approval from the institutional ethical review board and Informed consent, we selected 94 patients of mitral stenosis by non-probability consecutive sampling, who were planned for PTMC in the department of interventional cardiology of the hospital. The research was performed in the Department of Cardiology, Pervaiz Elhai Institute of cardiology, Bahawalpur between 18-Jan-2021 to 17-July-2022. Patients of mitral stenosis between age 15-60 years and of either gender were included. A heart valve meeting was conducted to document the treatment strategy. Patients having concomitant mitral regurgitation more than mild, left atrial clot, unable to carry out Tran’s esophageal echo, history of ischemic heart disease, and decided for MVR by the Institutional Heart Valve team were excluded from the study. Data regarding baseline patient characteristics such as age, gender, pre-op mitral valve area (MVA), Wilkin’s score, Tran’s mitral pressure gradients, and grade of mitral regurgitation were collected for each patient. In all patients, PTMC was done as per institutional guidelines. After PTMC all the patients were advised for follow-up after 72 hours of PTMC in the outdoor patient department. At follow-up echocardiography was done to determine the MVA, patients having MVA >1.5 cm² without significant MR and a decrease in mitral valve pressure gradient to 50% were documented as having successful PTMC.

All the study-related data was noted on a pre-designed proforma. The collected information was analyzed with SPSS version 20.0, descriptive statistics were used to calculate the mean and standard deviation for quantitative variables like age, Wilkin’s score, Pre-op MVPG, and pre-op MVA. Frequency and percentage were calculated for categorical variables i.e. gender, and success rate of PTMC. Effect modifiers such as age, gender, pre-op MVA, Wilkin’s score, and Pre-op MVPG were controlled through stratification. Post-stratification chi-square test was applied to determine the effect of these confounder variables on the success rate of PTMC. P-value ≤0.05 was taken as significant.

Results

The mean age of patients included in this study was 44.40±14.19 years. The minimum age was 17 years and the maximum age was 60 years. Mean Wilkin’s score of patients was 9.22±0.89. The minimum score was 9 and the maximum score was 14. The mean pre-operative MVPG was 29.17±4.41. The minimum MVPG was 21 and the maximum MVPG was 45. The mean post-operative MVPG of patients was 7.55±3.74. The minimum MVPG was 03 and the maximum MVPG was 20. The mean pre-operative MVA of patients was 0.73±0.10 cm². The minimum MVA was 0.50 cm² and the maximum MVA was 0.90 cm². The mean post-operative MVA of patients was 1.78±0.40 cm². The minimum MVA was 0.80 cm² and the maximum MVA was 2.40 cm² (Table 11). There were 62 (65.96%) female and 32 (34.04%) male patients. The success of PTMC was achieved in 74 (78.72%) and it was not achieved in 20 (21.28%) patients. (Figure 1). Stratification of age was performed and no association was found of age with success of PTMC. In patients aged 17-45 years, success of PTMC was achieved in 38 patients, and in having aged 46-60 years, it was achieved in 36 patients. This difference was statistically insignificant with a p-value of 0.194. Stratification of gender was performed and no association was found between gender and with success of PTMC. In male patients, the success of PTMC was achieved in 25 patients, and in female patients, it was achieved in 49 patients. This difference was statistically insignificant with a p-value of 0.919. Table 2 Stratification was also performed based on Wilkin’s score, MVPG, and MVA. There was no association was found between these variables and with success of PTMC (Table 1).

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Table 1: Stratification of Wilkin’s score to determine the association of Wilkin’s score with the success rate of PTMC with age.

Age group	Successful PTMC	Unsuccessful PTMC	P value
17-45 (n=45)	38 (84.4%)	7 (15.6%)	0.194
45-60 (n=49)	36 (73.4%)	13 (26.6%)	0.09

Table 2: Success of PTMC

Wilkin’s score	Successful PTMC	Unsuccessful PTMC	P value
8-11 (n=64)	47(73%)	17 (27%)	0.59
12 and above (n=30)	27(80%)	3(10%)	0.43

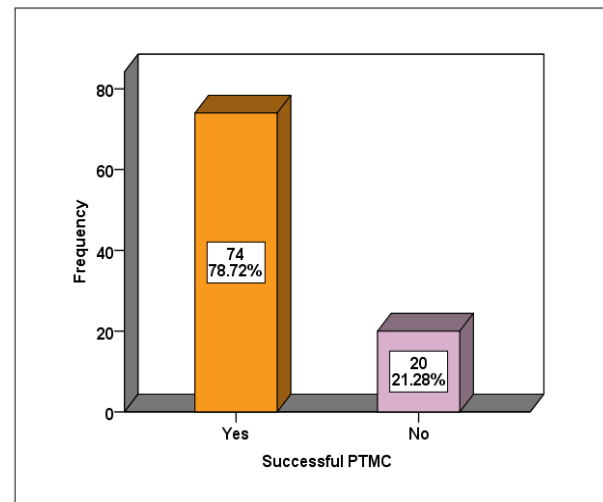


Figure 1: Success of PTMC as per defined criteria

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Discussion

Mitral valve stenosis is caused by many causes like rheumatic carditis, calcific degeneration, annular calcification, etc but rheumatic involvement is the main cause (10). PTMC is a balloon-based dilation that affects only rheumatic-based commissural fusion, so it is not useful in other cases.

Wilkin's score via TTE is almost mandatory before PTMC to assess the anatomic characteristics of the valve (11). PTMC was first developed and proposed clinically by Inoue in 1984. Among other balloon dilatation techniques, the Inoue technique uses a single balloon anterogradely via septal puncture and is more accepted than other techniques. In our study, we took 94 connective patients with mitral valve stenosis with a mean valve area of 0.90 ± 0.1 cm² before the PTMC procedure. After valvotomy, it was increased to 1.77 ± 0.4 cm². The overall success rate was 78.7%. Other parameters like LA pressure, pressure gradient across the mitral valve, and pulmonary pressures were decreased and there was significant improvement in clinical symptoms. Similar encouraging results were also reported in the NHLBI registry of 736 cases with mitral valve area improved significantly by PTMC. Mean MVA was 1.09 ± 0.29 cm² before PTMC and post PTMC it was 1.8 ± 0.15 cm² (12). Our findings are consistent with these and other studies. Likewise, SK Kundu et al showed that MVA increased by 31% post-PTMC with a marked significant reduction in TMPG (14).

In the study of Sadeghian et al., unsuccessful results were obtained in 25.5% these unsuccessful results were due to suboptimal secondary MVA < 1.5 cm² and post-procedure MR grade > 2 in 3.6%. They demonstrated the causes of unsuccessful results as higher Wilkin's score, old age, and larger LA size and valve thickness. Unsuccessful results were common with high Wilkin's score (13). This is in contrast to our study as the success rate was 78% with a high Wilkin's score. In our study, among unsuccessful results seen in 20 patients, the main reason was MVA less than 1.5 cm² which was seen in 18 patients, and the main reason was high calcium in 12 patients and high subvalvular disease component in 6 patients.

Other patients have MR with more than 1 grade worsening. A study by Alvarado-Pérez GS and Palacios-Rodríguez JM in a study of 363 patients of mitral stenosis reported a success rate of 59.9% in patients having Wilkin's score ≥ 8.8 . While a study conducted by Mughal et al. in a study of 100 patients reported a success rate of 86.2% in patients having Wilkin's score ≥ 8.9 . A study by Omar et al done in 2014 also showed that PTMC was successful in patients with high Wilkin's score 14. These two studies showed high success rate with high Wilkin's score as shown by our study. In a series of 912 consecutive patients that were followed for 20 years, independent predictors of primary endpoint included advanced NYHA class, age, lower MVA, previous valvular surgical history, the prevalence of MR, Wilkins score ≤ 8 , raised mitral gradient followed by PBMV, presence of atrial fibrillation and pulmonary hypertension (12).

In Pakistan, rheumatic mitral stenosis has a high prevalence, and patients are present in all age groups.

Elderly patients are also not uncommon with comorbidities and high Wilkin's scores. Surgery is often declined by

patients and sometimes by cardiothoracic surgeons due to higher comorbidities. A higher success rate with a high Wilkin's score in our study is encouraging. Highly symptomatic patients who are not eligible for surgical MVR can be relieved symptomatically by PTMC.

Conclusion

PTMC is a minimally invasive procedure used to treat severe rheumatic mitral stenosis with excellent immediate and long-term outcomes. In the present study, we found a success rate of 78.7% in patients with a high Wilkins score of ≥ 9 .

The main limitation of the study was the small sample size as compared to the disease burden in Pakistan. If the sample size is increased, the results will be better and more reliable. Secondly, the study did not assess the effect of individual components of Wilkin's score on success.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBCE-TCHJAD-0023/23)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

NAUMAN ALI (Associate Professor)

Coordination of collaborative efforts.

Study Design, Review of Literature, Conception of Study,

Final approval of the manuscript.

MUHAMMAD IRFAN (Assistant Professor)

Conception of Study, Development of Research

Methodology Design, Study Design, Review of manuscript.

MUHAMMAD SARWAR KHALID (Associate Professor)

Manuscript revisions, critical input.

Coordination of collaborative efforts.

Data acquisition, and analysis.

Manuscript drafting.

References

1. Wunderlich NC, Dalvi B, Ho SY, Kux H, Siegel RJ. Rheumatic Mitral Valve Stenosis: Diagnosis and Treatment Options. *Curr Cardiol Rep.* 2019; 21(3):14.
2. Asghar U, MT GF, Amjad M. Prevalence of rheumatic heart disease in different regions of Pakistan. *Pak J Med Health Sci.* 2017; 11(3):1049-52.
3. Ali L, Asghar N, Riaz R, Hussain M. Percutaneous transmitral commissurotomy (PTMC); Procedural success and immediate results, a tertiary care

hospital experience from a developing country. Professional Med J. 2016; 23(1):104-13.

4. Adhikari CM, Malla R, Rajbhandari R, Shakya U, Sharma P, Shrestha N, et al. Percutaneous transvenous mitral commissurotomy in juvenile mitral stenosis. Cardiovasc Diagn Ther. 2016; 6(1):20-4.

5. Akhtar B, Hanif A, Siddique K, Elahi S, Elahi S. Balloon mitral valvotomy: immediate outcomes, success, failure, and complications. Pak Heart J. 2019; 52(03):229-34.

6. El Shafey WE. Modified parameter of two-dimensional echocardiographic Wilkins score for assessment of rheumatic mitral valve stenosis. J Indian Acad Echocardiogr Cardiovasc Imag. 2018; 2(3):197-8.

7. Saji M, Ragosta M, Dent J, Lim DS. Use of intracardiac echocardiography to guide percutaneous transluminal mitral commissurotomy: a 20-patient case series. Catheter Cardiovasc Interv. 2016; 87(2):E69-E74.

8. Alvarado-Pérez GS, Palacios-Rodríguez JM. Percutaneous mitral balloon valvuloplasty: clinical and echocardiographic factors associated with success in a Tertiary-Care Hospital in Mexico. Rev Mex Cardiol. 2019; 29(4):159-67.

9. Mughal S, Hanif MI, Riaz A, Hanif A. Wilkin's score; predictive value of Wilkin's score in determining the procedural success of percutaneous transvenous mitral commissurotomy. Professional Med J. 2018; 25(9):1432-7.

10. Rowe JC, Bland EF, Sprague HB, White PD. The course of mitral stenosis without surgery: ten- and twenty-year perspectives. Ann Intern Med. 1960; 52(4):741-9.

11. Wilkins GT, Weyman AE, Abascal VM. Percutaneous balloon dilatation of the mitral valve: An analysis of echocardiographic variables related to outcome and the mechanism of dilatation. Br Heart J. 1988; 60(2):299-308.

12. Reid C, Otto C, Davis K, Labovitz A, Kisslo K, McKay C, et al. Influence of mitral valve morphology on mitral balloon commissurotomy: Immediate and six-month results from the NHLBI Balloon Valvuloplasty Registry. Am Heart J. 1992; 124(3):657-65.

13. Sadeghian H, Salarifar M, Rezvanfar M, Nematipour E, Mardanloo AS, Poorhosseini H-R, et al. Percutaneous transvenous mitral commissurotomy: significance of echocardiographic assessment in prediction of immediate result. Arch Iranian med. 2012; 15(10):629.

14. A Omar, A Ariff, R Zambahari and RM Ali. 15-year Outcomes and Predictors of Success for Percutaneous Mitral Commissurotomy for Rheumatic Mitral Stenosis. Circulation. 2014; 130:A20155.



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