Original Article

Percutaneous Transvenous Mitral Commissurotomy (Ptmc): Effectiveness In Pulmonary Hypertension With Severe Mitral Stenosis

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Abstract

Background: Mitral stenosis, which is caused by the constriction of the mitral valve, is a blockage of blood flow between the left atrium and left ventricle. Reportedly, rheumatic heart illness is the largest cause of mitral stenosis. Due to the thromboembolic phenomenon, left atrial dilatation and stasis related to mitral stenosis may result in the production of thrombus, which may induce cerebrovascular events, coronary embolization, renal emboli, and infarction

Objective: The study aimed to identify the incidence of reduction of severe pulmonary hypertension in patients with severe mitral valve stenosis 24 hours after PTMC as determined by echocardiography.

Study design: A cross-sectional study

Place and Duration: This study was conducted at The Aga Khan University Hospital Karachi **from February 2022 to February 2023**

Methodology: We included 105 male and female patients aged more than 15 years and below 60 years reporting severe mitral stenosis having increased pulmonary pressure higher than 50 mmHg being treated with elective PTMC at our hospital. Success was defined as a reduction in pulmonary hypertension of 1/3 from the baseline. Using SPSS version 21.0, data were analyzed, and all quantifications were made for the appropriate variables.

Results: The PTMC was effective among 96(91.43%) patients. There were 36(34.29%) males and 69(65.71%) females in the study, 34 (32.38%) patients had diabetes and 28 (26.67%) reported having hypertension. The mean BMI was 24.1 SD±1.89, the mean baseline PASP was 69.9 SD ±6.94, and the mean post-PTMC PASP was 41.8 SD ±8.2. We observed that the mean reduction in PASP was 35.3 ±7.29. Diabetes appeared to have a significant association with PTMC effectiveness with a p-value of 0.04.

Conclusion: According to transthoracic echocardiography data, we found that PTMC dramatically lowers pulmonary pressures in the immediate post-PTMC interval. In our study, 91.43% of study participants experienced pulmonary pressure reduction after PTMC.

Keywords: Percutaneous transvenous mitral commissurotomy, pulmonary hypertension, Mitral stenosis.

Introduction

Mitral stenosis, which is caused by the constriction of the mitral valve, is a blockage of blood flow between the left atrium and left ventricle. Reportedly, rheumatic heart illness is the largest cause of mitral stenosis [1]. Due to the thromboembolic phenomenon, left atrial dilatation and stasis related to mitral stenosis may result in the production of a thrombus, which may induce cerebrovascular vents, coronary embolization, renal emboli, and infarction [2, [3].

One-third of MS patients who have embolism-related problems have hearts beating normally and regularly from the sinus node. According to trans-esophageal echocardiography assessment and trans-thoracic echocardiography findings, the incidence of LA clot formation in sinus rhythm (SR) is 6.6% [4].When a thrombus is dislodged during the surgery, it is thought that embolization of left atrial thrombi is what largely causes these occurrences. Alternatively, it wouldn't be inappropriate to say that a left atrial clot is strictly prohibited for PTMC. Therefore, the best method to find any left atrial clot before having a balloon valvotomy is transesophageal echocardiography (TEE) [5, 6]

Rheumatic heart disease is more common and endemic in developing countries compared to affluent nations. Patients typically develop the condition early in life and show up later which accounts for pulmonary hypertension typically present with a more severe state. Our study aimed to identify the incidence of reduction in severe pulmonary hypertension in patients with severe mitral valve stenosis 24 hours after PTMC as determined by echocardiography.

Methodology

In this cross-sectional study, we included 105 male and female patients aged more than 15 years and below 60 years reporting severe mitral stenosis having increased pulmonary pressure higher than 50 mmHg being treated with elective PTMC at our hospital. However, we excluded the patients with aortic stenosis assessed on Echocardiography, multiple valvular lesions like mitral regurgitation and patients with left atrial (LA) clots. Patients having mitral valve area < 1 cm^2 on echocardiography were classified as a case of severe mitral stenosis. The sustained elevation of pulmonary artery systolic pressure to more than 50 mmHg at rest on echocardiography was labelled as severe pulmonary hypertension. After the hospital ethical committee's approval, we obtained patients' informed consent to use their data in research. Patients' personal data, including age, sex, and hospital identification number, were collected before they underwent echocardiographic evaluation 24 hours after PTMC. Success was defined as a reduction in pulmonary hypertension of 1/3 from the baseline. Using SPSS version 21.0, data were analyzed, and all quantifications were made for the appropriate variables.

Results

In the present study, we observed that the PTMC was effective among 96(91.43%) patients. There were 36(34.29%) males and 69(65.71%) females in the study, 34 (32.38%) patients had diabetes and 28 (26.67%) reported having hypertension. (As shown in Table I)

Table I Frequency Distribution of Sociodemographic Characteristics (n=105)

Variables	n	%
Gender		
Male	36	34.29
Female	69	65.71
Age		
Less than 40 years	66	62.86

More than 40 years	39	37.14
Diabetes		
Yes	34	32.38
No	71	67.62
Hypertension		
Yes	28	26.67
No	77	73.33
PTMC Effectiveness		
Yes	96	91.43
No	9	8.57

In this study, the mean age of the study participants was 32.91 SD±7.23 years, the mean BMI was 24.1 SD±1.89, the mean baseline PASP was 69.9 SD ±6.94, the mean post-PTMC PASP was, 41.8 SD ±8.21 we observed that the mean reduction in PASP was 35.3 ±7.29. (As shown in Table II)

Table II: Descriptive Statistics of Sociodemographic Characteristics

Variable	Mean	SD
Age (years)	32.91	±7.23
BMI (kg/m2)	24.1	±1.89
Baseline PASP (mmHg)	69.9	±6.94
Post PTMC PASP (mmHg)	41.8	±8.21
Reduction in PASP (%)	35.3	±7.29

In Table III we have detailed the Chi-Square association of the PTMC effectiveness with various factors. In this study, diabetes appeared to have a significant association with PTMC effectiveness with a p-value of 0.04.

Table III Chi Square Association of the PTMC Effectiveness with Various Factors

Variables	n(105)	PTMC Effectiveness				P-value
		Yes (96)		No (9)		
		n	%	n	%	
Gender						
Male	36	32	88.89	4	11.11	0.31
Female	69	64	92.75	5	7.25	
Age						
Less than 40 years	66	63	95.45	3	4.55	0.72
More than 40 years	39	33	84.62	6	15.38	
Diabetes						
Yes	34	32	94.12	2	5.88	0.04
No	71	66	92.96	7	9.86	
Hypertension						
Yes	28	24	85.71	4	14.29	0.5

No	77	71	92.21	5	6.49	

DISCUSSION

Numerous research has studied the risk factors for clot formation in Mitral Stenosis patients with normal sinus rhythm, and none of these studies has found a significant relationship between mitral valve surface area and clot formation[8]. The matter is contentious, nevertheless, a study found a substantial association between a small mitral valve surface area and the development of clots, with an odds ratio of 0.17 [9]. An efficient palliative method to ease MS symptoms and postpone the inevitable replacement of the mitral valve is balloon valvotomy. It also affects pulmonary pressure reduction, which lowers morbidity and mortality in this patient population.

According to the findings of the present study we observed that the PTMC was effective among 96(91.43%) patients. Our results are comparable with many other published works, a study conducted on immediate and long-term follow-up results observed the effects of valvotomy. The procedure was performed by all three common techniques of valvotomy. Success was achieved in about 90% of patients by more than doubling of mitral valve area and marked reduction in the transvalvular area [10]. While we observed 91.43% success in our study, in a similar study with a comparable sample size of 108 patients, Alkhalifa, et al reported that success was achieved in 94% of patients. [11]. However, Zaman et al. [12] reported higher figures that the procedure was successful in 96 cases. Another study showed that the late outcome has also been improved with immediate success to achieve a reduction in pulmonary pressures [13].

In the present study, we observed that the mean age of the patients was 32.91 SD±7.23 years, the mean BMI was 24.1 SD±1.89, Ali N et al reported a higher mean age compared to our study as the mean age of the patients was 35.45 ± 10.38 years whereas Mean BMI was 23.50±2.81 kg/m2. Comparatively lesser than the figures observed in our study [14].

In the present study, we observed mean baseline PASP was 69.9 SD ±6.94, which was higher in reported research at 72.61 ± 8.11 [14], In our study the mean post-PTMC PASP was, 41.8 SD ±8.21 and the mean reduction in PASP was 35.3 ±7.29. Ali N et al reported that comparatively higher post-PTMC PASP was 45.09 ± 6.06 mmHg and a relatively higher mean reduction in PASP was 37.92 ± 4.19% [14]

In general, it is advised that PTMC be done before to the onset of PVR and that doctors avoid waiting until it has already become irreversible [15].

Conclusion

According to transthoracic echocardiography data, we found that PTMC dramatically lowers pulmonary pressures in the immediate post-PTMC interval. In our study, 91.43% of study participants experienced pulmonary pressure reduction after PTMC.

Funding source

None

Conflict of interest

None

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