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EFFECTIVENESS OF PERCUTANEOUS TRANSVENOUS MITRAL COMMISSUROTOMY (PTMC) IN REDUCING PULMONARY HYPERTENSION IN PATIENTS WITH SEVERE MITRAL STENOSIS

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Contribution
NA conceived the idea and designed the study. Data collection and manuscript writing was done by NA, MS, KAH, and SA. All the authors contributed equally to the submitted manuscript.

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ABSTRACT

Objective: The objective of our study was to assess the reduction in severe pulmonary hypertension after PTMC in patients of severe mitral stenosis.

Methodology: One hundred twenty-four patients of severe mitral stenosis with severely elevated pulmonary pressures more than 50 mmHg between 15 to 60 years of age of either gender undergoing elective PTMC at Chaudry Pervaiz Elahi Institute of Cardiology, Multan were included in this study. Post PTMC pulmonary pressures were noted 24 hours after PTMC.

Results: Mean age of the patients was 35.45 ± 10.38 years. Diabetes mellitus was found to be present in 39/124 (31.5%), hypertension in 40/124 (32.3%) while no comorbidities were found in 62/124 (50%). Mean baseline pulmonary artery systolic pressure was found to be 72.61 ± 8.11 mmHg while mean pulmonary artery systolic pressure after PTMC was found to be 45.09 ± 6.06 mmHg. The pulmonary artery systolic pressure fallen from baseline by 37.92 ± 4.19 mmHg after the commissurotomy. Transvenous mitral commissurotomy was found to be effective with a minimum 1/3rd reduction in 119/124 (96%) while it was ineffective in 5/124 (4%) of the patients.

Conclusion: Therefore, we conclude that balloon valvotomy is a useful procedure which results in a significant reduction in mean pulmonary artery systolic pressure irrespective of age, gender or comorbidities.

Keywords: Mitral stenosis, Percutaneous transvenous mitral commissurotomy, Pulmonary hypertension, Pulmonary artery systolic pressure

INTRODUCTION

Mitral stenosis (MS) in 99% of cases is due to rheumatic involvement of this apparatus resulting in obstruction in flow from left atrium to left ventricle. Patients of mitral valve involvement typically appear in combination of stenosis and regurgitation in most cases. Left atrial dilatation and stasis secondary to mitral stenosis pilots thrombus formation leading to lethal concoction of vascular events including cerebrovascular events, coronary embolisation, renal emboli and infarction because of thromboembolic phenomenon.[1] Pulmonary pressures are usually elevated in patients with MS and add significantly to morbidity and mortality of patients even after percutaneous treatment.

The management approach to the individual with mitral stenosis depends upon symptomatic status, degree of stenosis and suitability of valve for percutaneous balloon mitral valvuloplasty. The technique of percutaneous balloon dilatation of the mitral valve by the trans-septal approach has been generally accepted as an alternative to mitral valve replacement or surgical commissurotomy in a subgroup of patients with symptomatic mitral stenosis.[2] About 1/3rd of the patients with MS and complications due to emboli are in normal regular rhythm from sinus node. The reported incidence of LA clot formation in sinus rhythm (SR) is 6.6%, assessed on trans-esophageal echocardiography and having no clot on trans-thoracic echocardiography.[3] These events are believed to be caused primarily by embolisation of left atrial thrombi, when a thrombus is dislodged during the procedure. Alternately it wouldn't be wrong to phrase left atrial clot is an absolute contraindication for PTMC. Therefore, Transesophageal echocardiography (TEE) is a best technique to detect any clot in left atrial before undergoing balloon valvotomy.[4,5]

In our part of the world, rheumatic heart disease is endemic and more prevalent then developed countries. Patients usually acquire disease at earlier age and present late. At presentation, pulmonary hypertension is usually severe. The purpose of our study was to determine the frequency of reduction in severe pulmonary hypertension 24 hours post PTMC assessed on Echocardiography in patients of severe mitral valve stenosis.

METHODOLOGY

It was a cross-sectional study conducted at Ch. Pervaiz Elahi institute of Cardiology, Multan over a period of one and half year from January 2016 till July 2017 involving 124 patients.

Patients of severe mitral stenosis with severely elevated pulmonary pressures more than 50 mmHg between 15 to 60 years of age of either gender undergoing elective PTMC at Chaudry Pervaiz Elahi Institute of Cardiology, Multan were included in this study. Whereas patients with multiple valvular lesions like mitral regurgitation, aortic stenosis assessed on Echocardiography and patients with left atrial (LA) clot assessed on Echocardiography were excluded. Patients having mitral valve area < 1 cm^2 on echocardiography were classified as a case of severe mitral stenosis.[6] Severe Pulmonary hypertension was defined as patients having sustained elevation of pulmonary artery systolic pressure to more than 50 mmHg at rest on echocardiography.[6]

Approval from hospital ethical committee was obtained and informed consent was taken from patients for using their data in research. The demographic information of these patients like age, sex, and hospital registration number was taken and then these patients were assessed 24 hours post PTMC on echocardiography. Reduction in pulmonary hypertension by 1/3rd from the baseline was considered as success. Data was analyzed by using SPSS version 21.0 and all quantifications were for respective variables.

RESULTS

Out of 124 patients, 46(37.1%) were male and 78(62.9%) were female. The average age of patients was 35.45±10.38 years. Mean BMI was 23.50±2.81 kg/m2. Among 124 patients, 39(31.5%) patients were found with diabetes mellitus, 40(32.3%) with hypertension. Mean PASP at base line and Post PTMC were 72.61 ±8.11 mmHg and 45.09 ± 6.06 mmHg respectively while mean reduction in PASP

was 37.92 ± 4.19%. Detailed descriptive statistics of study population are presented in Table 1.

In our study, PTMC effectiveness was found for 119(96%) patients. Stratification was done and post stratification chi square test were applied. The results shows insignificant association of PTMC effectiveness with gender (p=0.437), age (p=0.825), diabetes mellitus (p=0.674) and hypertension (p=0.705). Detailed results of association are presented in Table 2.

Table 1: Characteristics of study population

Characteristics	Summary
Gender	
Male	46(37.1%)
Female	78(62.9%)
Age(years)	35.45±10.38
BMI(kg/m^2)	23.50±2.81
Diabetes	
Yes	39(31.5%)
No	85(68.5%)
Hypertension	
Yes	40(32.3%)
No	84(67.7%)
Baseline PASP(mmHg)	72.61 + 8.11
Post PTMC PASP(mmHg)	45.09 + 6.06
Reduction in PASP (%)	37.92 + 4.19

Table 2: Association of PTMC Effectiveness with risk factors

	Effectiveness of PTMC		P-Value
	Yes	No	
N	**119**	**5**	
Gender			
Male	44(37%)	2(40%)	0.437
Female	75(63%)	3(60%)	
Age Group			
<40 years	71(59.7%)	2(40%)	0.825
≥40 years	48(40.3%)	3(60%)	
Diabetes Mellitus			
Yes	37(31.1%)	2(40%)	0.674
No	82(68.9%)	3(60%)	
Hypertension			
Yes	38(31.9%)	2(40%)	0.705
No	81(68.1%)	3(60%)	

DISCUSSION

Balloon valvotomy is an effective palliative technique to relieve MS symptoms and delay inevitable mitral valve replacement. It has also impact in reducing pulmonary pressures and thus reducing morbidity and mortality in these patient group. In our study there has been mean reduction of PASP by about 38 mmHg which is very significant and as per success criteria that one third reduction in PASP is found in 96% of population.

Study done by Arora et al.[7] showed 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 transvalvular area. These all results in reduction in pulmonary artery pressure on short and long term follow up. Alkhalifa, et al studied one hundred and eight patients undergoing balloon valvotomy.[8] They clearly showed the same beneficial effects of decreasing transmitral PG, increasing mitral valve area and decreasing pulmonary artery pressures. Success was achieved in 94% of patients. Bhatet al studied one hundred patients who were randomized into 2 groups to undergo balloon valvotomy by means of the Inoue balloon technique (IBMC, n = 49) or metallic commissurotomy (PMMC, n = 51. Success of valvotomy, procedure-related complications, and follow-up events of the 2 techniques were compared.

Procedural success was similar in both groups: 45 of 49 procedures (91.8%) in the IBMC group, compared with 46 of 51 procedures (90.18%) in the PMMC group (P = 1.0). After a follow-up period of approximately 4 months, both groups had similar event rates and comparable hemodynamic parameters (P = not significant) and there was similar reduction PASP in both these groups.[9] In another study conducted by Zaman et al.[10] the procedure was successful in 96 cases. Substantial immediate drop of both transmitral gradient and mean left atrium pressure was recorded.

Pulmonary artery pressure reduced significantly in majority of Patients. Mean Diastolic pressure fell from 18.5 ± 5.1mmHg to 5.4 ± 3.1 mmHg. Mean LA Pressure fell from 36.2 ± 7.6mmHg to 11.6 ± 6.1mmHg and RV Systolic Pressure fell from 70 ± 10mmHg to 30 ± 10mmHg. These all results also match with our findings. In other studies late outcome has also been shown to improve with this

immediate success in achieving reduction in pulmonary pressures.[11]

Although the drop in PASP may be lower in our study as compared to previous mentioned studies but still our study holds the fact of reduction in PASP. PTMC should be performed before rise of PVR and physician should not wait for it to become irrevesible.[12,13] As our patient population has more has more advanced disease so that could be reason of difference in less reduction in PASP.

CONCLUSION

We concluded that PTMC is very effective in reducing pulmonary pressures in immediate post PTMC period assessed through transthoracic echocardiography. In our study PTMC is effective in reducing pulmonary pressures more than one third in 96% of study patients.

REFERENCES

1. Halley CM, Thamilarasan M, Griffin BP. Valvular heart disease. In: Griffin BP, Topol EJ, editors. Manual of cardiovascular medicine. 3rd ed. New Dehli: Lippincott Williams& Wilkins; 2009. p.214-38.
2. Manning WJ, Reis GJ, Douglas PM. Use of transesophageal echocardiography to detect left atrial thrombi before percutaneous dilatation of mitral valve: a prospectus study. Br Heart J. 1992;67:170-3.
3. Manjunath CN, Srinivasa KH, Panneerselvam A, Prabhavathi B, Ravindranath KS, Rangan K, et al. Incidence and predictors of left atrial thrombus in patients with rheumatic mitral stenosis and sinus rhythm: a transesophageal echocardiographic study. Echocardiography. 2011;28(4):457-60.
4. Tansuphaswadikul S, Hengrussamee K, Chantadansuwan T, Silaruks S, Kehasukcharoen W, Saejueng B, et al. Transesophageal echocardiography during percutaneous mitral commissurotomy in patients with left atrial thrombus. J Med Assoc Thai. 2001;84(11):1534-40.
5. Hassan M, Hussain C, Gul AM, Jan HU, Hafizullah M. Frequency of left atrial and appendage clot in patients with severe mitral stenosis. J Ayub Med Coll Abbottabad. 2010;22(2):40-2.
6. Marcus RH, Sareli P, Pocock WA, Barlow JB. The spectrum of severe rheumatic mitral valve disease in a developing country. Correlations among clinical presentation, surgical pathologic findings, and hemodynamic sequelae. Ann Intern Med. 1994;120:177.
7. Arora R, Kalra GS, Singh S, Mukhopadhyay S, Kumar A, Mohan JC, et al. Percutaneous transvenous mitral commissurotomy: immediate and long-term follow-up results. Catheter Cardiovasc Interv. 2002;55(4):450-6.
8. Alkhalifa MS, Huda HME, Suliman FA, Ali IA, Elsadig TE, Gasim MKA, et al. Percutaneous Transmitral Balloon Commissurotomy [PTMC] Procedural success and immediate results at Ahmed Gasim Cardiac Center. Sudan J Med Sci. 2006;1:115-20.
9. Bhat A, Harikrishnan S, Tharakan JM, Titus T, Kumar VK, Sivasankaran S. Comparison of percutaneous transmitral commissurotomy with Inoue balloon technique and metallic commissurotomy: immediate and short-term follow-up results of a randomized study. Am Heart J. 2002;144(6):1074-80.
10. Zaman KS, Saghir T, Dadjan, Masood T, Tasneem H, Faruqui A. Percutaneous metallic mitral commissurotomy at NICVD. Pak Heart J. 2001;34:2-7.
11. Jorge E, Pan M, Baptista R, Romero M, Ojeda S, Suárez de Lezo J, et al. Predictors of very late outcome after PTMC in mitral stenosis. Am J Cardiol. 2016 Jun 15;117(12):1978-84.
12. Elmaghawry LM, El-Dosouky II, Kandil NT, Sayyid-Ahmad AM. Pulmonary vascular resistance and proper timing of percutaneous mitral balloon valvotomy. Int J Cardiovasc Imaging. 2018;34(4):523-9.
13. Hakan Ozkan 1, Tahsin Bozat, Selma Kenar Tiryakioglu, Hasan Ari. Should we wait until severe pulmonary hypertension develops? Efficacy of percutaneous mitral ballooon valvulaoplasty in severe pulmonary hypertension. A sub group analysis of our experience. Cardiol J. 2016;23(2):184-8.