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SEVERE MITRAL STENOSIS;

IN-HOSPITAL OUTCOMES OF PERCUTANEOUS TRANSVENOUS MITRAL COMMISSUROTOMY (PTMC) IN PATIENTS

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ABSTRACT... Objectives: To evaluate the immediate outcomes of PTMC in patients with severe mitral valve stenosis. **Study Design:** Cross-sectional study. **Setting:** Ninety (90) subjects who underwent PTMC in Cardiac Catheterization Department of CPE Institute of Cardiology. **Period:** June 2008 to June 2011. **Methods:** Patients with severe MS having mitral valve (MV) area $\leq$1.0 cm^2 and having morphology suitable for PTMC in the absence of regurgitation and left atrial clot were included in this study. An increase in mitral valve area more than 50% of the baseline area without the development of moderate to severe MR was considered as the procedural success. Data were analyzed using SPSS V19. Pre and post procedural outcomes were measured using paired sample t-test. **Results:** There were a total number of ninety (90) patients in this study. Mean age of subjects was 28.08+9.61 years. There were more females 59 (65.5%) as compared to only 31 (34.5%) males. There was significant increase in mitral valve area, 1.83+0.36 cm^2 post-PTMC versus 0.63+0.17 cm^2 pre-PTMC (p-value <0.001). There was significant decrease in Peak pressure gradient (PPG) from 28.31$\pm$6.01 mmHg to 12.85$\pm$3.20 mmHg after PTMC (p-value <0.001). There were also significant reductions in mean pressure gradient and pulmonary artery systolic pressures after PTMC with p-value <0.001 and <0.001 respectively. PTMC was successful in 87 (97.7%) patients and it failed in only 3 (3.3%) patients. **Conclusion:** PTMC is an excellent treatment option regarding optimal outcomes and success rate in patients of severe mitral stenosis especially when performed by experienced interventionists.

Key words: Mitral Stenosis, Percutaneous Transvenous Mitral Commissurotomy (PTMC), rheumatic fever, rheumatic heart disease.

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INTRODUCTION

Mitral valve Stenosis (MS) is known to be the commonest long term complication of rheumatic fever.[1] About 25% of subjects are presented with isolated mitral stenosis (MS) and additional 40% are presented with combined mitral stenosis and regurgitation.[2,3] Medical treatment, percutaneous transvenous mitral commissurotomy (PTMC) and surgery are the three different treatment modalities for the management of MS depending upon the severity of the disease.[4] PTMC is a non-surgical minimally invasive procedure of choice in patients with severe MS. Recent AHA/ACC guidelines have recommended PTMC as class-I indication for severe MS patients, if the morphology of the valve is favourable for PTMC and in the absence of atrial thrombus and mitral regurgitation.[5] The success rate PTMC is greater in patients with thin and pliable mitral valve leaflets The results are comparable with open and closed mitral valvotomy if the patient selection is accurate.[6,7]

Echo-cardiography is the most widely used tool for the evaluation of mitral valve disease and for selecting the appropriate patients for PTMC. The outcomes of PTMC are better in patients having low echocardiographic score.[8] Very few data is available from Pakistan regarding outcomes of PTMC for severe MS. So in this study we evaluated the immediate outcomes of PTMC in patients with severe mitral valve stenosis.

METHODS

This cross-sectional study was carried out on ninety (90) subjects who underwent PTMC in cardiac catheterization department of CPE

Institute of Cardiology from September 2014 to June 2015. Patients with severe MS having mitral valve (MV) area ≤1.0 cm^2 and having morphology suitable for PTMC in the absence of regurgitation and left atrial clot were included in this study.

In all patients PTMC was done under local anesthesia using right femoral venous approach. Self-positioning Inoue balloon was selected for commissurotomy in all patients. Balloon diameter was selected by using the following equation; [Balloon Size (mm) = Height in cm/10 +10]. Initial inflation was started at 1 to 2 mm less than the maximum diameter of balloon. The balloon was inflated to the maximum diameter in 2nd attempt, if hemodynamic outcomes were sub-optimal in 1st attempt. All hemodynamic measurements were repeated after the procedure.

Post-procedural echocardiography was done to evaluate post-procedural MV area, peak mitral valve pressure gradient and mitral regurgitation after 24 hours of the procedure. An increase in mitral valve area more than 50% of the baseline area without the development of moderate to severe MR was considered as the procedural success

Data were analyzed using SPSS V19. Pre and post procedural outcomes were measured using paired sample t-test.

RESULTS

There were a total number of ninety (90) patients in this study. Mean age of subjects was 28.08±9.61 years. There were more females 59 (65.5%) as compared to only 31 (34.5%) males. Mean mitral valve area pre-PTMC was 0.63±1.17 cm^2 Mean pre-procedural echo score was 7.81±1.15. Mean left atrial size was 47.78±3.73 mm before the procedure. After 24 hours of PTMC, mean mitral valve size and peak pressure gradient across mitral valve was measured and compared with the pre-operative value. There was significant increase in mitral valve area after PTMC. Mitral valve area was 1.83±0.36 cm^2 post-PTMC versus 0.63±0.17 cm^2 pre-PTMC (p-value <0.001). There was significant decrease in Peak pressure gradient (PPG) after PTMC, peak pressure gradient dropped from 28.31±6.01 mmHg to 12.85±3.20 mmHg after PTMC and this was a statistically significant decrease in PPG (p-value <0.001). Mean pressure gradient dropped from 15.23±3.81 mmHg to 4.01±1.32 mmHg after PTMC (p-value <0.001). There was also a significant decrease in pulmonary artery systolic pressures after the procedure. Pulmonary artery systolic pressure decreased to 33.89±9.68 mmHg from its baseline value of 75.65±15.78 mmHg after PTMC (p-value <0.001). PTMC was successful in 87 (97.7%) patients and it failed in only 3 (3.3%) patients. There was only 1 (1.11%) patient in whom severe MR occurred during the procedure and mitral valve replacement was done. There was no in-hospital mortality.

Variable Name	Value
Age (Years)	28.08±9.61
Female Gender (%)	59 (65.5%)
Male Gender (%)	31 (34.5%)
Mitral Valve Area (cm^2)	0.63±1.17
Peak Pressure Gradient (mmHg)	28.31±6.01
Mean Pressure Gradient (mmHg)	15.23±3.81
Pulmonary Artery Systolic Pressure (mmHg)	75.65±15.78
Pre-procedure Echo Score	7.81±1.15
Left Atrial Size (mm)	47.78±3.73

Table-I. Pre-ptmc characteristics of patients.

Variable Name	Pre-procedure	Post-procedure	P-Value
Mitral Valve Area (cm^2)	0.63±0.17	1.83±0.36	<0.001
Peak Pressure Gradient (mmHg)	28.31±6.01	12.85±3.20	<0.001
Mean Pressure Gradient	15.23±3.81	4.01±1.32	<0.001
Pulmonary Artery Systolic Pressure (mmHg)	75.65±15.78	33.89+9.68	<0.001

Table-II. Comparison of pre-ptmc and post-ptmc variables.

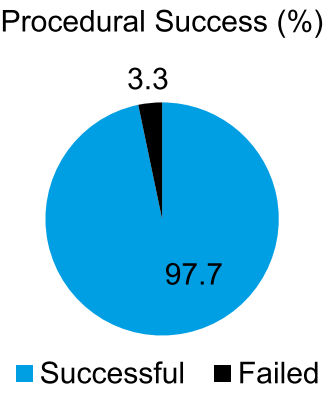

Figure-1. Procedural success rate

DISCUSSION

Isolated mitral stenosis is a well-established complication of rheumatic fever. Incidence of rheumatic fever is declining in modern countries but is still common in developing countries. In Pakistan, the prevalence of rheumatic fever is about 2.2% so the incidence of rheumatic heart disease is also high.[9] The worldwide prevalence of rheumatic heart disease has been reported to be 18.6/1000 with variations among different geographic regions.[9-13] Females are most likely to develop mitral stenosis as compared to males.[14]

PTMC is a minimal invasive procedure performed through interatrial septal puncture for opening the mitral valve area with no or minimum number of complications.[15] In this study, we evaluated the immediate post-procedural outcomes of PTMC in patients with significant mitral stenosis. Small residual ASD after interatrial septal puncture are left in only 5% of the patients, most of these are closed or decreased with the passage of time and the defect is very rarely large enough to cause right sided heart failure.[16]

In our study, there were more females 65.5% as compared to males. Other studies have also concluded female predominance in patients who underwent PTMC. In these studies, the proportion of female population has been reported to be 65 to 88%.[14,17,18] In our study, pre-procedural MV area was less as compared to other studies. In our study, the mean MV area was 0.63 cm^2. While in other studies the mitral valve area has been reported from 0.77 cm^2 to 0.90 cm^2.[17,19] In our study, mean mitral valve area was less as compared to these studies.

We found significant increase in MV area after PTMC, it increased from 0.63+0.17 cm^2 to 1.83$\pm$0.36 cm^2. Other studies have also shown similar results of increase in mitral valve area after PTMC.[20] In our study, procedural success was achieved in 97.7% patients. Similar success rates of PTMC have been reported from Pakistan and from other countries.

The risk of development of severe MR has been reported to be up to 8.4% during PTMC.[21] In our study, severe MR occurred in only 1.11% patients. Taimur el al. also have reported lower incidence (1.7%) of severe MR during PTMC.[22] From this it can be concluded that incident of severe MR may depends on the experience of cardiologists and the risk of MR is less in centers where PTMCs are done on large scale. In this study, we found significantly successful outcomes of percutaneous transvenous mitral commissurotomy in patients of moderate to severe mitral stenosis suitable for PTMC.

CONCLUSION

PTMC is an excellent treatment option regarding optimal outcomes and success rate in patients with severe mitral stenosis especially when performed by experienced interventionists.

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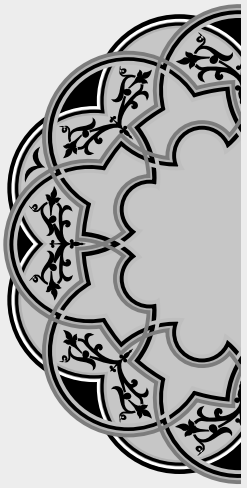

"You cannot push anyone up the ladder unless he is willing to climb."

Andrew Carnegie

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Haroon Aziz Khan Babar	Supervised the whole study, Discussion, Methods.	
2	Dr. Abubakr Ali Saad	Data analysis, introduction helped in discussion and material and methdos.	
3	Dr. Zahid Rafique Butt	Helped in introduction, Data analysis, Material and methods.	
4	Dr. Zainab Khan	Data collection, and helped in introduction writing.	
5	Saima Dastgeer	Data analysis, Material and methdos designing.	
6	Dr. Muhammad Masood Iqbal	Helped in discussion and introduction writing.	