

Outcome of Percutaneous Transvenous Mitral Commissurotomy According to Age, Gender and Heart Rhythm

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ABSTRACT

Background: Percutaneous transvenous mitral commissurotomy (PTMC) is the recommended treatment in the severe mitral stenosis with mitral valve area \leq 1.5 sq. cm and favourable mitral valve morphology without Left atrium (LA) clot.

Methods: A retrospective study done for one year among all the patients who had undergone PTMC in 2016. Successful PTMC was defined as increase in Mitral valve area (MVA) more than or equal to 1.5 sq. cm or increase in area by more than 50% from baseline. Data was analyze using SPSS-20.

Results: Three hundred thirty six patients with mean age 34.08 ± 12.0 of which male were 97 (26.9%) and female were 239 (71.1%). There were 225 (67%) sinus rhythm (SR) and 111 (33%) atrial fibrillation (AF). The median Pre PTMC area and Left atrial (LA) Pressure were 0.9 sq cm and 24 mmHg respectively. The overall success of PTMC was in 289 (86%). The successful outcome in age categories less than 20 years, 20-40, 40-60 and more than 60 years in order are 39 (83%), 174 (86.6%), 71 (86.6%) and 5 (83.3%). Success for male was 84 (86.6%) and in female 205(86%). Success percentage in SR was 192 (86%) and in atrial fibrillation was 97 (87.4%).

Conclusion: The outcome of PTMC in terms of change in mitral valve area was similar to the different age categories, gender and presence and absence of atrial fibrillation.

Keywords: age; atrial fibrillation; gender; mitral stenosis; PTMC.

INTRODUCTION

Mitral stenosis, one of the complications of rheumatic fever, when severe can be treated either by Percutaneous transvenous mitral commissurotomy (PTMC) or by valve replacement.¹ According to AHA/ACC guidelines for the management of patients with valvular heart disease PTMC is recommended as Class I indication for symptomatic patients with severe MS (mitral valve area \leq 1.5 sq cm.) and favourable valve morphology in the absence of left atrial thrombus or moderate or severe MR.² Rheumatic heart disease has also been one of the common cardiac disease in Nepal.^{3,4} The outcome study in PTMC has been done in the hospital by different authors in different period.⁵⁻⁷ The results have shown the statistically differences in mitral valve area and left atrial pressure after PTMC. This study defines the outcome of the PTMC in symptomatic MS in terms of change in mitral valve area and left atrial pressure in different age category, gender and the presence or absence of concomitant atrial fibrillation.

METHODS

The study was nonrandomized cross sectional retro-

spective study done in Shahid Gangalal National Heart Center. The study was duly approved by the institutional review committee of the institution. All patients who had undergone PTMC in the year 2016 were enrolled in study. Failed PTMC and Redo PTMC were excluded. Discharge reports, follow up outpatient cards and cath records were reviewed and registered and data available regarding particulars, heart rhythm and pre and post procedure reports regarding Mitral valve area (MVA) and Left atrium (LA) gradient were made. Successful PTMC was defined as increase in MVA more than or equal to 1.5 sq. cm or increase in area by more than 50% from baseline. Data was tabulated in Excel and analysed in SPSS. Categorical values were expressed as frequency and percentage while continuous variables were presented as means. Nonparametric data were expressed by using Man-Whitney test. Chi-square test was used in comparing two categories. An independent t test was used to compare MVA and LA Pressure. P-value <0.05 was considered statistically significant.

RESULTS

Three hundred thirty six patients with mean age 34.08 ± 12.0 were studied. Male were 97 (28.9%) and female were 239 (71.1%). There were 225

(67%) sinus rhythm and 111 (33%) atrial fibrillation. The distribution is shown in (Table 1).

Table 1. Immediate optimal outcome of PTMC with MVA and LA Pressure.

Categories	Median Mitral valve area (sq cm)			Median Left Atrial pressure (mmHg)			Success (%)
	Pre PTMC	Post PTMC	Change	Pre PTMC	Post PTMC	Change	
Age (years)							
<20	0.9	1.5	0.7	26	14	12	83
20-40	1	1.6	0.7	26	14	12	86.6
40-60	1	1.5	0.6	24	14	10.5	86.6
> 60	0.95	1.5	0.55	19.5	10.5	10	83.3
Gender							
Male	0.9	1.5	0.6	26	14	10	86.6
Female	1	1.6	0.7	24	14	12	86
Rhythm							
Sinus	1	1.6	0.6	26	14	12	86
AF	0.9	1.6	0.7	24	14	11	87.4

The mean mitral valve area and mean LA Pressure in Pre-PTMC and Post PTMC were distributed as (Figure 1). The median changes in mi-

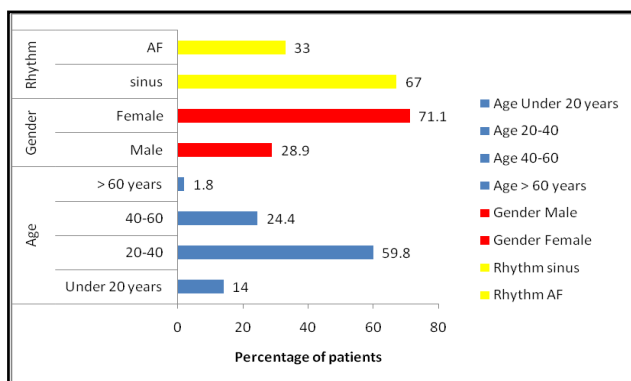


Figure 1. Baseline characteristics of study population.

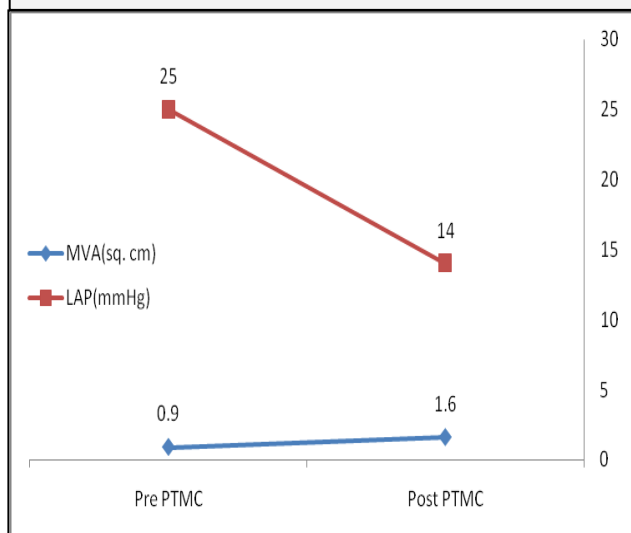


Figure 2. Changes in median mitral valve area and median LA Pressure before and after PTMC.

tral valve area and LA pressure according to different age category, gender and presence or mitral valve area were shown in (Figure 2). The overall changes in mitral valve regurgitation were enlisted as in (Figure 3).

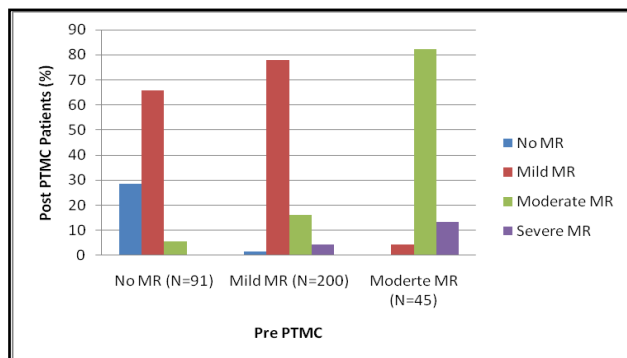


Figure 3. Changes in mitral valve regurgitation before and after PTMC Procedure.

DISCUSSION

Wilkins had described echocardiographic score as the sole determinant of the predictor of outcome after balloon valvuloplasty ruling out the effect by age, gender and presence of atrial fibrillation.⁸ Sadeghian had described the young age, small left atrial size and thinner mitral valve as predictors of successful result.⁹ Optimal outcome in this study was when mitral valve increases more than 1.5 sq cm and more than 50% in the baseline MVA. There was no statistically difference in terms of outcome regarding age, gender and presence or absence of atrial fibrillation. The overall success of PTMC was 86 % (289) which is similar for different categories. Success rate were 84% by Shrestha¹⁰, 90.95 % by Arora¹¹ and 97% by Nobuyoshi.¹² 188(56%) patients had Post PTMC mitral valve area ≥ 1.5 sq.cm. 255(75.1%) had increase by

50% in premitral valve area. Herrmann had described it as 72% and 67% respectively.¹³ Success in gender for male 86.6% and female was 86%. Success percentage in SR was 192 (86%) and in atrial fibrillation were 97 (87.4%). Success rate of 84.2% in atrial fibrillation has been described by Nair⁶. Palacios has described male gender and younger patient as the independent predictor of PTMC success.¹⁴ The prevalence of rheumatic mitral stenosis has been high in underdeveloped countries like India and Nepal. The study added to the common knowledge that the prevalence of mitral stenosis is higher in female. F: M ratio of 2.4 in our study is similar to the reading of 2.3 by Manjunath¹⁵ and 1.95 by Chiang.¹⁶ The median age of the female patients was 32 years (IQR 17) which was higher than of male (median age 35 IQR 16). The age group in which maximum case recorded for both gender was 30-40 years. Similar high prevalence in the middle aged female has been described.^{15,16} For male and female mean Pre MVA (0.9 cm² (IQR 0.2) and 1 cm² (IQR 0.2), mean Post MVA (1.5 sq. cm (IQR 0.4) and 1.6 sq. cm (IQR 0.3), changes in MVA 0.6 (IQR 0.4) and 0.7 (IQR 0.3) were recorded. Chiang had highlighted the higher echocardiographic score (p<0.001) and the smaller doppler derived mitral valve area in male compared to female.¹⁶ As per Shaw one of the success parameter is not being female gender.¹⁷ No statistical differences occurred between male and female in our study. Balloon dilation in PTMC results in the cleavage of the commissural plane causing increase mitral valve area (p<0.001). Higher Wilkins score has higher commissural calcification (p=0.013).¹⁸ Fluoroscopic calcification, echo score and commissural echo calcification have been related with aging by Shaw.¹⁷ Severity of stenotic lesions and the outcomes is so accordingly with increasing ages. The age ranged from 10 years to 90 years with the highest number (30%) were seen in age 30-39 years. The successful outcome of PTMC was similar to different age category in increasing order are 39(83%), 174(86.6%), 71 (86.6%) and 5(83.3%). Adhikari et al had described 83% in age more than 60 and 87.3 % in age less than 21.5.¹⁹ Ages and atrial fibrillation category had been related (p=0.001) and size of left atrium was not correlated with ages (p=0.071) or rhythm disturbances (p=0.390). The left atrial pressure before and after in the different age category did not vary much as in contradiction to the observation of Shaw that the younger patients achieved greater increase in valve area.¹⁷ Overall the prevalence of atrial fibrillation occurred in 111(33%) patients which is in the range described by different

authors.²⁰ The age group in which maximum percentage of atrial fibrillation occurred was 60 years or more. The median age of the patients with AF exceeded the median age with sinus rhythm by 10 years [40 (IQR 13) vs. 30(IQR 17)]. Such differences has also been described by Majeed (35.49 vs. 28.7).²¹ Krauski has described about the prevalence of AF increase with age and left atrial size.²² Significant differences occurred among the different age groups but not for left atrial size. Such indifferences to left atrial size but for left atrial pressure has been described by Ramakrishna.²⁰ The prevalence of atrial fibrillation occurred in 6(12.8%), 65 (32.3%), 36(43.9%) and 4(66.7%) in respective age categories. The prevalence of atrial fibrillation described by Adhikari et al. 61.3% after 60 years and 12.3% before age 21 go accordingly.^{5,19} The median size of MVA in sinus rhythm was 1 sq.cm (IQR 0.2) and in atrial fibrillation was 0.9 (IQR 0.2); Post MVA was 1.6 (IQR 0.4) and 1.6(IQR 0.4) and changes in MVA was 0.6 and 0.7 respectively. LA pressure was similar in sinus rhythm and AF as Pre PTMC 26 mm Hg (IQR 8.8) and 24 mmHg (IQR 9) and post PTMC 14 mmHg (IQR 5.8) and 14 mmHg (IQR 4). No differences in MVA and MVPG between the patients with sinus rhythm and atrial fibrillation was shown by Miura.²³ In contrast to our findings Abe S had shown the greater increase in MVA and lower Pre PTMC and higher Post PTMC area in atrial fibrillation patients.²⁴ PTMC had been undertaken in patients with moderate MR in 45 (13.3%) patients who wants the postponing of the timing of mitral valve replacement, patient unwillingness for long term anticoagulation, not underwanting chest surgery and fear of complications with prosthetic valves. PTMC in severe MS and moderate MR has been described.^{25,26} Nine (4.5%) patients with no or mild MR developed severe MR in our studies. Different studies had described the development of severe MR in range 1.4 to 9.4%.^{14,27} Six (13.3%) of moderate MR turned to severe after PTMC. PTMC in moderate MR can have severe MR in 11-20%.^{25,26} Interestingly, MR severity decreased after PTMC to mild in 4% of moderate MR. Such decrement has been seen in the range from 0 to 42%.^{25,26} Lu has described such decrement as cause of commissural splitting and increment as rupture of mitral valve leaflets. Before PTMC, the papillary muscles are shortened and adherent to valve causing inadequate opening in diastole or rise improperly to close in systole. Balloon dilation will cause fuse commissures to separate and mitral valves becomes relatively mobile causing better closing in systole.²⁸ One of the limitation of the study is it is retrospective. Addition of

Wilkins score or other scores would have increased the effectiveness of study. The change in clinical status of patients, echocardiography findings of pulmonary artery pressure and trans-mitral gradient and right ventricular parameter could not be included in study. Mitral valve area calculation and degree of mitral regurgitation studied were subjective differing with different observers. Further prospective study with follow up for immediate, intermediate and long term outcomes of PTMC is suggested.

CONCLUSION

The outcome of PTMC in terms of change in mitral valve area was similar to the different age categories, gender and presence and absence of atrial fibrillation.

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Conflict of Interest: None.

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