

Study of Efficacy of Balloon Mitral Valvotomy in Adult Rheumatic Mitral Stenosis

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Abstract

Aims: The objective was to study the safety and efficacy of balloon mitral valvotomy in rheumatic severe mitral stenotic adult patients and to evaluate the clinical, echocardiographic and haemodynamic profile both before and immediately after the procedure. *Methods:* Forty adult patients aged 24yrs or older were taken for the study. All underwent balloon mitral valvotomy. We used Accura balloon in our institution. The procedure was successful in all the patients. Then clinical, echocardiographic and haemodynamic parameters were analysed before and after the procedure. *Results:* New York Heart Association functional class was II and III in 60% and 40% respectively. Atrial fibrillation was seen in the 25% of the patients. Mitral valve deformity as per wilkins score was 8.6 ± 0.67 . Mitral valve area index by 2D echo was $0.621 \pm 0.097 \text{ cm}^2/\text{m}^2$, Mitral valve gradient $14.63 \pm 5.33 \text{ mm hg}$, and mean PASP was $60.10 \pm 19.32 \text{ mm of hg}$, after intervention the values were $1.29 \pm 0.18 \text{ cm}^2/\text{m}^2$, (0.0001) , $5.78 \pm 2.24 \text{ mm of hg}$, $(p < 0.001)$ and 41 ± 15.62 respectively $(p = 0.0001)$. The mean value for left atrial pressure before $24.9 \pm 6.77 \text{ mmhg}$ and after $14.20 \pm 4.92 \text{ mmhg}$, significantly lower after balloon mitral valvotomy $(p \text{ value } 0.0001)$. The procedural success was 100%. *Conclusion:* Balloon mitral valvotomy is safe and effective in Adult rheumatic mitral stenosis and provides better immediate results.

Keywords: Rheumatic Heart Disease; Balloon Mitral Valvotomy; Mitral Stenosis.

Introduction

Rheumatic fever is one of the commonest cause of valvular heart disease in children and adolescents in developing countries where rheumatic fever is still endemic. However, it is rarely seen in developed countries. In India children and young adults less than 20 years old are commonly affected by mitral stenosis [1,2]. The Rheumatic mitral valve stenosis is also not uncommon in late adulthood nowadays. Mitral stenotic patients frequently suffer from pulmonary oedema requiring invasive treatment [3,4,5]. Until the mid-1980s the treatment that was done was only surgical closed or open valvotomy. In adults, balloon mitral valvotomy results were similar to those obtained after open mitral valvotomy [6,7] and better results than closed mitral valvotomy [6]. Therefore, balloon mitral valvotomy became more popular, and was practiced extensively in adult and elderly patients. Thus, the purpose of this study was

to evaluate the immediate results of balloon mitral valvotomy in the adult population in our centre.

Methods

Study Population

Forty consecutive adult patients who had severe rheumatic mitral stenosis were included in the study. All underwent balloon mitral valvotomy in our institution. The study period was from October 2011 to November 2012. The baseline characteristics of the study group are shown in Table 1. Mean age was 40.1 ± 11.48 years (range 24 to 68). Females were 22 in number (55%), Males were 18 (45%). Majority of the Patients were having NYHA class II and III symptoms prior to the procedure. There were more patients with atrial fibrillation, 10 (25%). Body surface area was taken to calculate indexed mitral valve area.

Echocardiographic Evaluation

2D Echo-Doppler examination was done for all patients before the procedure. we assessed Mitral valve structure using Wilkins score [8] (Table 1).

Depending on degree of jet extension into the left atrium, mitral regurgitation was graded by colour Doppler using Helmake classification [9] on a scale of 1 to 4. 2D echo planimetry was used to determine the Mitral valve area. Transoesophageal echocardiography was done to rule out any clots in the left atrium or the left atrial appendage. After 24 hours Echo-Doppler examination was repeated to assess the severity of mitral regurgitation and other parameters.

Mitral Valvotomy Procedure

Mitral Valvotomy Procedure was performed under local anaesthesia after taking an informed consent from the patient or the parents. Right and left heart catheterisation was done. Before and after the procedure intracardiac pressures were recorded in all patients. Brockenbrough needle (Medtronic, USA) and Mullins sheath (Medtronic, USA) were used to puncture and to cross the septum. Based on the height of the patient (height (cm)/10) + 10 mm = recommended balloon size) optimal size of Accura (Vascular Company Limited, Doddaballapur, Karnataka, India) balloon was decided. Diluted contrast was used to inflate the balloon. Serial dilatations was done starting with recommended balloon size and upgraded till optimal result obtained.

Statistical Analysis

Descriptive statistical analysis was done in the present study. For continuous measurements mean standard deviation were used and for results on categorical measurements number and percentages were used.

Student "t" test was used to find the significance of study parameters on continuous scale. Chi-square/2x2, 2x4, 2x5 Fisher exact test were used to find the significance of study parameters on categorical scale. Student "t" test was used to test the homogeneity samples based on age and Chi-square test to assess the homogeneity of samples based on parameters on categorical scale.

For the analysis of the data the statistical software (SPSS 15.0, Stata 8.0, MedCalc 9.0.1 and Systat

11.0) were used and to generate graphs and tables Microsoft Word and Excel have been used.

Results

The procedure was successfully completed in all the adult patients. There was no death noted during the study. Haemodynamic parameters significantly improved as shown in Table 2 (all $p < 0.001$). Mitral valve area increased from 0.88 ± 0.122 to 1.81 ± 0.23 cm^2 ($p < 0.001$). Mitral valve area index which was 0.62 ± 0.0958 cm^2/m^2 , significantly increased to 1.29 ± 0.18 cm^2/m^2 ($p = 0.0001$) (Fig. 1). No severe mitral regurgitation (grade 3) was observed.

Mitral valve area of 1.5 cm^2 , mitral valve area index 0.9 cm^2/m^2 and percentage increase of mitral valve area 50% in the absence of severe mitral regurgitation after the procedure was defined as Procedural success and it was obtained in all 40 (100%) patients.

Table 1:

Baseline characteristics	Adult group (N = 40)
Age (yrs) mean \pm SD	40.1 W 11.48
Females	22 (55%)
Atrial fibrillation	10 (25%)
NYHA Functional Class	
\geq II	24 (60%)
\geq III	16 (40%)
Left Atrial enlargement	35 (87.5%)
Bi - Atrial enlargement	5 (12.5%)
Wilkins Score	8.6 ± 0.67
Body surface area	1.4

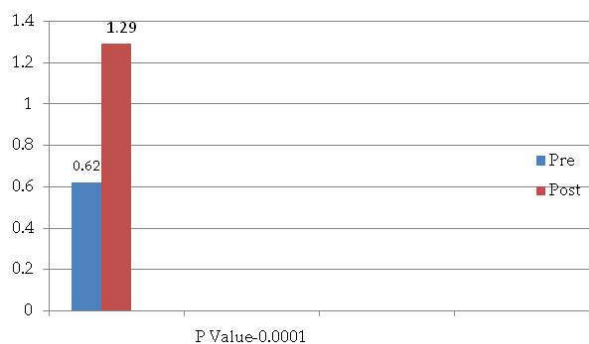


Fig. 1: Mitral valve index area before (pre) and after (post) balloon mitral valvotomy

Table 2: Comparison of Pre-BMV and Post BMV echocardiographic and hemodynamic parameters in adult group (mean± SD).

Echo & hemodynamic parameters	Pre	Post	P Value
MVA (cm ²)	0.88 ± 0.12	1.80± 0.23	<0.0001
Indexed MVA (cm ² /m ²)	0.62 ± 0.095	1.29± 0.18	<0.0001
Mean MV gradient (mm of hg)	14.63 ± 5.33	5.78± 2.24	<0.001
PASP (mm of hg)	60.10 ± 19.32	41 ± 15.62	<0.0001
LAP (mm of hg)	24.9 ± 6.77	14.20± 4.92	<0.0001

Discussion

The immediate results in all patients were better with a significantly larger mitral valve area index and no significant complications. Following balloon mitral valvotomy the gain in mitral valve area index was statistically significant ($p < 0.0001$) and similar results were obtained in other studies [10] like, in Gamra et al.'s study [11] the better results in the patients were attributed to smaller left atrial dimensions and more pliable valve which is comparable to our study.

No mortality was observed during the study. Procedural success was good in the group. Other investigators reported similar results [12-13]. We used balloon size whatever is recommended based on adult nomograms.

Conclusion

Balloon mitral valvotomy in adult patients is effective, safe, better and the results are good. Balloon mitral valvotomy results in an increased valve area, symptom relief and decrease in pulmonary artery systolic pressure. This study extends the observation on safety and efficacy of balloon mitral valvotomy in the adult patients.

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