Immediate Outcome of Percutaneous Balloon Mitral Valvotomy in Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal

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ABSTRACT

Background and Aim: *Percutaneous balloon mitral valvotomy is well established as safe and effective procedure for patients with mitral stenosis due to Rheumatic Heart Disease. There are some retrospective studies on safety and efficacy of it in different subgroups of patients from our centre. Our study aims to assess the safety, efficacy and outcome of it in Shahid Gangalal National Heart Centre, Kathmandu, Nepal.*

Methods: *A Single centre, prospective study was conducted from July 1st 2013 to June 31st 2014 in our centre. All the patients who underwent percutaneous balloon mitral valvotomy for moderate to severe mitral stenosis during the study period were included. Safety and efficacy of the procedure was analyzed.*

Results: *There were 262 patients enrolled in the study among which 194 (74%) were females. Mean age of patients was 33.2±12.5 years. Seventy patients (26.7%) were in atrial fibrillation, six (2%) were pregnant, three (1%) had history of stroke, twelve (4.6%) underwent previous surgical or balloon commissurotomy. The mean left atrial pressure reduced from 26.8 ± 8.9 mmHg to 15.6 ± 7.2 mmHg ($p < 0.05$).The mean mitral valve area increased from 0.9 ± 0.17 cm2 to 1.6 ± 0.28 cm2 ($p < 0.05$). Forty nine patients (18.7%) developed moderate to severe mitral regurgitation. There was no mortality related to the procedure. The procedural success was achieved in 84% patients.*

Conclusion: *Our study suggests that percutaneous balloon mitral valvotomy is a safe and effective procedure for symptomatic mitral stenosis patients.*

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Key words
Mitral stenosis, Percutaneous balloon mitral valvotomy, Rheumatic Heart Disease.

INTRODUCTION

The decrease of the incidence of Rheumatic heart disease (RHD) in developed countries had already begun in 1910, and it is now below 1.0 per 100 000.[1] However, RHD is still endemic in developing countries. Annually we have around 10% to 15% of patients admitted due to RHD in our hospital.[2] Approximately

25% of all patients with RHD have pure mitral stenosis (MS), and an additional 40% have combined MS and mitral regurgitation (MR).[3-5]

Based upon the nature and severity of MS, patients can be managed with medical management, Percutaneous balloon mitral valvotomy (PBMV) or surgery. PBMV has emerged as an alternative to surgical mitral commissurotomy for the treatment of symptomatic patients with MS. After its introduction in 1984 by Inoue et al.[6], the technique evolved rapidly.

PBMV is recommended as a Class I indication for symptomatic patients (NYHA functional class II, III or IV), with moderate to severe MS and valve morphology favourable for PBMV in the absence of left atrial (LA) thrombus or moderate to severe MR.[7] There are some retrospective studies conducted on safety and efficacy of the procedure in different subgroups of patients in our centre.[8,9] Looking at the burden of disease and the result of retrospective studies, we aim to carry out a prospective study to assess the safety, efficacy and outcome of PBMV.

METHODS

It is a prospective, single centre study conducted at Shahid Gangalal National Heart Centre, Kathmandu, Nepal from July 1st 2013 to June 31st 2014. Ethical approval was taken from the Heart centre ethical committee. Informed consent was taken from the patient and patient's relative. Two hundred and sixty two consecutive patients who underwent PBMV for moderate to severe MS during the study period were included in this study. Those patients who underwent rescue PBMV were excluded from the study. Performa was designed to collect patient information which included; age, gender, medication, pulmonary artery systolic pressure, LA size, rhythm, mitral valve area (MVA) and mean LA pressure before and after PBMV.

All patients with symptomatic moderate and severe MS with favorable mitral valve morphology were included. Patients with more than moderate MR, having other significant valve lesions requiring surgical treatment, or evidence of LA and left atrial appendage (LAA) thrombus were excluded. All the emergency cases were excluded from the study. In patient taking anticoagulant PT/INR was checked on the day of PBMV. Patients underwent PBMV only when PT/INR was below 1.5 to decrease the risk of bleeding.

PBMV was done with all aseptic condition through right femoral venous approach under local anaesthesia. The balloon catheter size was selected according to the patient's height using simple equation: (height [cm]/10+10). Transseptal puncture was done using a Brockenbrough needle inserted via the right femoral vein. The LA mean pressures were recorded before and immediately after the procedure.[2] D echo, colour flow mapping and MVA calculation using planimetry was done before PBMV to evaluate MVA and MR. A trans- esophageal echocardiography (TEE) was done one day before the PBMV to rule out the presence of LA and LAA clot. Before discharge (on the next day of procedure) echocardiography was done to evaluate the MVA and MR.

Successful PBMV was defined as mean LA pressure decrease by >50% as compared to the baseline, MVA increase by > 50% as compared to the baseline and final absolute mitral valve area of > 1.5 cm2 in the absence of more than moderate MR. Complications like cardiac tamponade, MR, CVA and acute pulmonary oedema were recorded.

RESULTS

Among the 262 patients included in the study 194 (74%) were female. Their age range was from 10 years to 76 years and mean age was 33.2±12.5 years. Atrial fibrillation was present in 70 (26.7%) patients; 6 (2%) patients were pregnant; 3 (1%) patients had stroke, 12 (4.6%) patients underwent previous surgical or balloon commissurotomy.

Table 1: Demographics.

Male	69	26%
Female	193	74%
Atrial Fibrillation	70	26.7%
MR present	168	64.1%
No MR	94	35.9%

Table 2: The MVA and mean LA pressure Pre and Post PBMV

Parameters	Pre-PBMV	Post-PBMV	P value
MVA (cm2)	0.9 ± 0.17	1.6 ± 0.28	<0.05
Mean LA pressure (mmHg)	26.8 ± 8.9	15.6 ± 7.2	<0.05

LA size ranged from 3.3 cm to 7.9 cm with the mean of 4.97±0.76 cm. MR was present in 168 (64.1 %) and the rest 94(35.9%) did not have any MR.

The procedural success was achieved in 84% patients. The mean LA pressure significantly decreased from 26.8 ± 8.9 mmHg before the procedure to 15.6 ± 7.2 mmHg ($p < 0.05$). The mean MVA significantly increased from 0.9 ± 0.17 cm2 to 1.6 ± 0.28 cm2 ($p < 0.05$). Moderate to severe MR was seen in 49(18.7%) patients after PBMV but none of them required emergency mitral valve replacement. There was no mortality related to the procedure.

DISCUSSIONS

MS is sequel of RHD which occurs from leaflet thickening, commissural fusion, and chordal shortening and fusion. Closed mitral commissurotomy was first described by Harken and Bailey in the late 1940s.[10] Subsequently, after the development of cardiopulmonary bypass, the open surgical commissurotomy replaced the closed technique in most countries in the late 1960s and early 1970s. In 1982, Kanji Inoue, a Japanese cardiac surgeon, first developed the idea that a degenerated MV could be inflated using a balloon made of strong yet pliant natural rubber.[11] As demonstrated in pathologic and echocardiographic studies, the mechanism by which PBMV relieves MS is the same with that of surgical commissurotomy, that being the separation of the mitral leaflets along the fused commissures. After a decade of practice, the results and complications of PBMV compare favorably to those of the surgical commissurotomy. So, PBMV is now a well established treatment modality for moderate to severe MS.

There have been only few studies conducted on efficacy of PBMV in pregnancy, elderly and children. In a study conducted by Shrestha et al.[8] procedural success rate of PBMV in patients below 15 years of age was 94%, similarly a study conducted in elderly by Adhikari et al.[9] showed success rate of 83.6%. However, all of these studies were retrospective.

Among 262 patients we analyzed MS was predominantly seen in female. Our procedural success rate was 84% which is comparable to previous studies by Nobuyoshi et al. (92%) in Japan,[12] Alkhalifa et al. (94.5%) in Sudan,[13] Arora et al. (99.8%) in New Delhi, India.[14] MR severity may increase in 25-83% of cases [12,14,15] and 49 patients (18.7%) in our study developed moderate to severe MR. There was no mortality related to the procedure.

Limitation of our study includes a single center, non randomized study with no long term follow up to evaluate long term outcome.

CONCLUSION

The results of this study show that PBMV is a safe procedure with good success rate for symptomatic MS.

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