

**ORIGINAL RESEARCH ARTICLE****BALLOON MITRAL VALVULOPLATY(BMV): AN EARLY EXPERIENCE IN CHITWAN MEDICAL COLLEGE**SR Regmi^{*}, BM Dhital¹, B Sharma², S Regmi¹¹Department of Cardiology, Chitwan Medical College, Bharatpur, Chitwan, Nepal.²Department of Anesthesiology, Chitwan Medical College, Bharatpur, Chitwan, Nepal.***Correspondence to:** Dr. Shyam Raj Regmi, Cardiology Unit, Chitwan Medical College, Bharatpur, Chitwan, Nepal.Email: shyamregmi2003@gmail.com**ABSTRACT**

Balloon Mitral Valvotomy (BMV) is one the preferred modality of treatment for Rheumatic mitral stenosis. This is usually performed with onsite surgical backup to tackle the complications like cardiac tamponade needing surgical drainage and severe mitral regurgitation which requires emergency Mitral Valve Replacement. Our aim is to evaluate the pre and post procedural outcomes of the BMV, without onsite surgical backup. Total patients were 88 who underwent BMV in Chitwan Medical College, from Feb 2014 to Jan. 2016. All symptomatic patients (NYHA class II- IV) with their mitral valve area (MVA) <1.5cm² were enrolled. Detail clinical evaluation and Echocardiography was done before and after the procedure. The procedure was performed under local anesthesia, using the step-wise Inoue balloon dilation with the ante grade transvenous approach. The successful procedure was 87 (98.8 %). The mean age was 38+13 yrs, mean pre BMV MVA= 0.85+0.18 cm², mean Post BMV MVA =1.76+0.23 cm², by plannimetry. Pre BMV mean left atrium pressure=23.10+6.79 mmHg and post BMV mean left atrium pressure=12.48+4.86mmHg. Minor complication like puncture site hematoma in 3 (3.44%) patients, vasovagal attack in 5 (5.74%) patients after intra atrial septal puncture, Ventricular arrhythmia in 3(3.44%) patients and supraventricular arrhythmia in 8 (9.19%) patients. Severe mitral regurgitation occurred in 4 (4.59%) patients and managed medically. Cardiac tamponade developed in 1(1.2%) patient, pericardiocentesis done. Balloon Mitral Valvotomy is safe and effective procedure for patient with severe and symptomatic patient with Rheumatic MS. It can be formed without onsite surgical backup with experience hand.

Key words: *Balloon mitral valvotomy, Mitral stenosis, Chitwan Medical College***INTRODUCTION**

Mitral stenosis is a common clinical problem in countries with high rheumatic disease prevalence like ours. For several decades surgical commissurotomy was being performed in patient with severe mitral stenosis.¹ However, balloon mitral valvuloplasty (BMV) has been established as an effective method for treating mitral stenosis with result comparable to surgical commissurotomy(CMC).^{2,3} Since its introduction in the early 1980s, BMV have lead to its world wide adoption.⁴ Two BMV techniques have

been extremely used; the Inoue balloon technique and the trans septal over the wire balloon technique. Studies to date have shown equal efficacy of the two BMV methods in terms of valve enlargement, although the inoue approach is simpler , faster and yielded similar benefit and is also associated with a lower risk of creating severe mitral regurgitation.⁵ Chitwan medical college is the only one center outside Kathmandu where BMV is being performed routinely till date. However efficacy and safety

of BMV in our subset especially where there is no immediate surgical back-up is not known. We designed this study to evaluate the safety of BMV for the treatment of mitral stenosis where there is no immediate cardiac surgical back-up.

METHODS

Eighty eight patient underwent BMV in chitwan medical college in past two years (from Feb. 2014 to Jan. 2016). This is the prospective study. All patient underwent BMV were enrolled in this study. Baseline data were obtained. Two-dimensional echocardiography was done to assess valve morphology and pre-BMV valve area. Transoesophageal echocardiography (TEE) were done to rule out left atrial and left atrial appendage clot.

BMV procedure under antibiotic coverage using local anaesthesia with conscious sedation as necessary was done with an inoue balloon with the standard antegrade trans septal technique. The procedure was performed in the fasting state. Femoral venous approach was used in all cases. Unfractionated heparin 3000IU was given intravenously after trans septal puncture. The method of balloon sizing was similar to that used in inoue- balloon BMV and was based on body height. Successful BMV means 100% enlargement of valve area without creating significant symptomatic severe mitral regurgitation.

Data for all cases were collected prospectively and analyzed using SPSS software. Data are reported as mean \pm SD. P-values <0.05 were considered significant.

RESULTS

Out of 88 patient, 59(67.05%) were female. Mean age was 38 ± 13 years. 73% were in atrial fibrillation. 65(73.86%) Patient were in NYHA class I and II

and 23(26.14%) in NYHA III. 4 (0.05%) patient were re-do BMV cases. 2(0.02%) cases had associated single vessel coronary artery disease. The procedure was unsuccessful in one case in which we could not perform septal puncture. This was the case of post surgical commissurotomy with midline sternotomy incision. Mean pre- BMV mitral valve area as assessed by echocardiography $0.85 \pm 0.18 \text{ cm}^2$ was increased to mean post BMV area $1.76 \pm 0.23 \text{ cm}^2$. Mean pre BMV Left atrial (LA) pressure $23.10 \pm 6.79 \text{ mmHg}$ was dropped to mean post LA pressure $12.48 \pm 4.86 \text{ mmHg}$. There was significant decrease in pulmonary arterial pressure in all cases. No patient was left with residual MS (MVA $<1.5 \text{ cm}^2$). All patients had symptomatic improvement. Four patient (4.49%) developed severe mitral regurgitation after the procedure. All of them were managed medically and remained symptom free for one and half year follow-up and none of them required mitral valve replacement. One patient (1.2%) developed cardiac tamponade after septal puncture and was managed by pericardiocentesis and BMV procedure was completed. Minor stroke was developed in two (2.3%) patients. No death reported after the procedure. Puncture site hematoma occurs in 3(3.44%). Non fatal Ventricular arrhythmias in 3(3.44%) and supraventricular arrhythmias in 8(9.19%) were noted during procedure.

Patients clinical characteristics are shown in table 1

Table 1 : Clinical characteristics

Parameters	N=88
Age(years)	38 ± 13.77
Male	29(32.95%)
Female	59(67.05%)
Re-do BMV	4(4.49%)
Pre- BMV MVA(cm^2)	0.85 ± 0.18
Post BMV MVA	1.76 ± 0.23
NYHA class I and II	65(73.86%)
NYHA class III	23(26.14%)

Pre- BMV LA pressure(mmHg)	23.10±6.79
Post BMV LA pressure(mmHg)	12.48±4.86

Table 2: Complications

Parameters	N=88
Severe MR	4(4.49%)
Minor stroke	2(2.3%)
Cardiac tamponade	1(1.14%)
Need for MVR	0
Death	0
Puncture site hematoma	3(3.44%)
Vasovagal attack	5(5.74%)
Non fatal VT	3(3.44%)
Supra ventricular arrhythmias	8(9.19%)

DISCUSSION

Balloon mitral valvotomy (BMV) is a relatively safe procedure and effectively relieves the symptoms in mitral stenosis. But it is a relatively blind procedure and is accompanied by various complications. G. Packirisamy, P. Arun Prasath, K. Geofi George, E et al⁵ retrospectively studied a total of 1374 patients who underwent BMV in the period between October 2000 and October 2011. The complications observed were mitral regurgitation of varying grades, pericardial effusion, cardiac tamponade, atrial fibrillation, transient ischemic attack, cerebrovascular accident, seizures, detached coil wire and on table death. Mitral regurgitation was observed in 53 patients(3.85%). But acute severe mitral regurgitation requiring mitral valve replacement was noticed in 17 (1.23%) patients. Moderate mitral regurgitation occurred in 7 patients. These patients were followed up on medical treatment. Mild mitral regurgitation of hemodynamic insignificance was noticed in 29 patients. Cardiac tamponade occurred in 17 patients (1.23%). Emergency pericardiocentesis and subsequent balloon dilatation was done in 14 patients and the remaining 3 patients were transferred for

surgery. Mild pericardial effusion was seen in 7 patients and BMV was deferred in the three of these patients. Atrial fibrillation was encountered in 14 patients (1.018%). Of the 14 patients, six required DC cardioversion, there was spontaneous termination in seven patients and only one patient had persistent atrial fibrillation following procedure. Two patients developed cerebrovascular accident following balloon dilatation which recovered gradually and one patient had a transient ischemic attack. One patient had seizures and required mechanical ventilation during the procedure but recovered later. Coiled wire got detached in the left atrium in one patient and it was removed using a snare. One patient died on table and the reason for death was not made out.

Similarly, various cardiac catheterization laborator⁶⁻¹⁰ reported the complications of BMV as follows. Failure rate ranges from 1-15%. Procedural mortality ranges from 0.5-3.0%. Incidence of hemopericardium varies from 0.5- 12%. Embolism is encountered in 0.5 -5% of cases. Severe MR, which occurs in 2-10% cases is a result of non commissural leaflet tearing. Urgent surgery is seldom needed for complication (<1%).

Cardiac tamponade and acute severe mitral regurgitation are the most important complications following balloon mitral valvotomy which might need immediate cardiac surgery in the form of repair of the punctured side and mitral valve replacement. Our study showed the incidence of severe MR in 4 (4.49%) patient which is similar to above mentioned large studies. Among 4 patients, two patients had poor valve morphology (Echo score= 10-11), severe heart failure(NYHA III-IV) and they refused cardiac surgery. All were managed medically and improved symptomatically. Regarding other complications like hemopericardium, minor stroke, supraventricular and ventricular arrhythmias, incidence is lower in

our study as compared to above studies. Immediate cardiac surgery was not needed.

CONCLUSION

Balloon Mitral Valvotomy is safe and effective procedure for patient with severe and symptomatic patient with Rheumatic MS. It is feasible even in the newly emerging cardiac catheterization center like ours. It can be formed without onsite surgical backup with experience hand.

REFERENCES

1. Regmi SR, Maskey A, Dubey L et al. Balloon Mitral Valvuloplasty (BMV) in pregnancy: A Four-year experience at Shahid Gangalal National heart center(SGNHC), Nepal. *NHJ* 2009;6:35-38.
2. Turi ZG, Reyes VP, Raju S et al. Percutaneous balloon versus surgical close commissurotomy for mitral stenosis: A prospective randomised trial. *Circulation* 1991;83:1179-1185.
3. Reyes VP, Raju BS, Wynne J et al. Percutaneous balloon valvuloplasty compared with open surgical commissurotomy for mitral stenosis, *N Eng J Med* 1994;331:961-967.
4. Vahamian A, Baumgartner H, Bax J et al. Guidelines on the management of valvular heart disease:task force on the management of valvular heart disease of the European Society of cardiology.*Eur Heart J* 2007;28:230-68.
5. G. Packirisamy, P. Arun Prasath, K. Geofi George, E.et al. Complications during Balloon Mitral Valvotomy-Analysis of 11 Years Data. *American journal of cardiology* 109;7: s66.
6. Hung JS, Lau KW. Pitfalls and tips in inoue balloon mitral commissurotomy. *Cathet Cardiovasc Diagn* 1996;37:188-99.
7. Complications and Mortality of Percutaneous Balloon Mitral Commissurotomy. A Report from the National Heart, Lung, and Blood Institute Balloon Valvuloplasty Registry. *Circulation* 1992;85:2014-2024.
8. Inoue K, Owaki T, Nakamura T, Kitamura F, Miyamoto N. Clinical application of transvenous mitral commissurotomy by a new balloon catheter. *J Thorac Cardiovasc Surg* 1984;87:394-402.
9. Manjunath CN, Gerald D, Srinivasa KH, Patil CK, Venkatesh HV, et al. The Indian Experience of Percutaneous Transvenous Mitral Commissurotomy: Comparison of the Triple Lumen (Inoue) and Double Lumen (Accura) Variable Sized Single Balloon With Regard to Procedural Outcome and Cost Savings. *J Interv Cardiol* 1998;11:107-112.
10. Shankarappa RK, Panneerselvam A, Dwarakaprasad R, Nayak MH, Nanjappa MC. Removal of broken balloon mitral valvotomy coiled guidewire from giant left atrium using indigenous snare. *Cardiovasc Interv and Ther* 2011;26: 60-63.