

# Heart Failure Study: Profile of Heart Failure Admissions in Medical Intensive Care Unit

Regmi S\*, Maskey A\*, DUBey L\*

\*Shahid Ganalal National Heart Centre, Kathmandu, Nepal

**Corresponding:** Dr. Shyam Raj Regmi.

Shahid Ganalal National Heart Centre, Bansbari, Kathmandu, Nepal Tel:00977-1-4371322, 00977-1-4371374.

Fax 00977-1-4371123, Email: shyam\_regmi2003@yahoo.com

## Abstract

Heart failure (HF) is a major cause of morbidity and mortality all over the world. In developed countries because of aging population and increased prevalence of coronary artery disease, heart failure has attained epidemic proportions, whereas, in developing countries like Nepal, rheumatic heart disease is still the commonest cause of HF admission in medical intensive care unit (MICU). A retrospective study analysing registered data of HF admissions in MICU of Shahid Ganalal National Heart Centre (SGNHC) from August 2002 to October 2008. Among these, 1771 patients were admitted for management of HF and were included in this study. Mean age was  $45.07 \pm 35.09$  (ranges from 11 years to 95 years). 836 (47%) were male and 935 (53%) were female.

Rheumatic heart disease causing valvular cardiac lesion leading to HF was found in 791 (45%) patients. Dilated cardiomyopathy in 424 (24%), Ischemic heart disease in 378 (1%), hypertensive heart failure in 101 (6%) and HG due to congenital heart disease was found in 43 (2%) patients. Though, HF due to COPD / Cor-pulmonale is usually discouraged to be admitted in this heart centre, still 34(2%) patients were admitted for the management of HF due to COPD/cor-pulmonale. Rheumatic heart disease causing valvular cardiac lesion leading to HF admission was still the commonest cause of HF admission in MICU in our heart centre. Despite ACC/AHA guideline suggesting use of beta-blocking agent in patients with heart failure, only 22% of our patients received that agent. Thus, many patients were not being managed fully in accordance with international evidence based guidelines.

**Keywords :** Heart Failure, Rheumatic Heart Disease, beta Blockers

## INTRODUCTION

Congestive heart failure (CHF), or heart failure, is a condition in which the heart is unable to pump enough blood to the body's various organs. This can result from coronary artery disease, high blood pressure, heart valve disease due to past rheumatic fever or other causes like cardiomyopathy, congenital heart disease, endocarditis and myocarditis. Coronary artery disease is the main cause of CHF in developed world. Heart failure is a common reason for urgent admission to hospital in the medical intensive care unit (MICU), and is a major cause of morbidity and mortality. In 1950s rheumatic heart disease was the most common cause of heart failure even in developed countries. The prevalence of CAD increased from 22% to nearly 70% in 1970s.

Rheumatic fever was the one of the commonest topic in most of the medical journals. After 1960s, the trend was gradually changed to coronary artery disease in developed world whereas rheumatic heart disease is still the commonest cause of heart failure in developing world. It was estimated recently that worldwide 15.6 million people have rheumatic heart disease and that there are 470,000 new cases of rheumatic fever and 233,000 deaths attributable to rheumatic fever or rheumatic heart disease each year. These are conservative estimates; the actual figures are likely to be substantially higher.

Almost all these cases and deaths occur in developing countries. In Nepal, heart failure is one of the commonest causes for hospital admission. This study was designed to evaluate heart failure profile at medical intensive care unit.

## MATERIALS AND METHODS

This is a retrospective study analysing registered data of HF admissions in MICU of Shahid Ganalal National Heart Centre (SGNHC) from August 2002 to October 2008. All patients admitted for heart failure management of any NYHA functional class were included in this study. Patient admitted in MICU for post procedural management (like post BMV, post right and left heart catheterisation, post pericardiocentesis), acute coronary syndrome, admitted for management of arrhythmias were excluded from this study.

## RESULTS

Total 2551 patients were admitted in medical ICU at national heart center, Nepal, from August 2002 to October 2008. Seven hundred and eighty cases were excluded from this study because they were admitted for non-heart failure reason. So, only 1771 patient were included in this analysis. 836 (47%) were male and 935 (53%) were female. Age ranges from 11 years to 95 years and mean  $45.07 \pm 35.09$ .

Table 1. Various causes of Heart Failure in patients admitted in MICU		
Causes	Number Percentage	
	(n=1771)	(%)
Rheumatic heart disease	791	45
Idiopathic dilated		
Cardiomyopathy	424	24
Ischemic heart disease	378	21
Hypertensive heart disease	101	6
Congenital heart disease	43	2
COPD/Cor-pulmonale	34	2

Rheumatic heart disease causing valvular cardiac lesion leading to HF was found in 791 (45%) patients. Idiopathic dilated cardiomyopathy in 424 (24%). Ischemic heart disease in 378 (1%), hypertensive heart failure in 101 (6%) and HF due to congenital heart disease was found in 43 (2%) patients. Though, HF due to COPD/Cor-pulmonale.

Commonest presenting symptom was leg swelling (76%) followed by shortness of breath (72%). Commonest sign was bilateral pedal edema (66%), bilateral basal crepitations (36%) and hypotension (SBP <90mmHg) in 33%.

Regarding the treatment, 92% patients received Frusemide, 84% received Angiotensin converting enzyme inhibitor, 15% received angiotensin receptor blocker, 36% received spironolactone and 22% received beta-blocking agents. In hospital mortality was 9.4%.

## DISCUSSION

Rheumatic heart disease (RHD) continues to be a major public health problem and is an important cause of morbidity and mortality in developing countries. Many cases of RHD are first detected when they progress to cardiac failure. Despite various measures no appreciable decline in prevalence of RHD has been documented. RHD leads to permanent damage to heart valves. The heart valve is damaged by a disease process that generally begins with a sore throat caused by beta generally begins with a sore throat caused by beta hemolytic streptococcus and may eventually cause RF, RF is uncommon

in US and other developed countries it is a disease of poverty. In developed world, coronary artery disease was incriminated as the predominant cause for heart failure, but there are indigenous populations in whom documented rates of RF and RHD are among the highest in the world. Prevalence of RHD in school children in Nepal is 1.2/1000. In developed countries it has been possible to halt progression of RHD to more severe valvular heart lesions, if subclinical carditis is diagnosed early in the course of the disease and treated with secondary prophylaxis. Unfortunately, this is not the case in Nepal, because patients remain asymptomatic for 10-20 years, and only seek medical attention after presenting with symptoms of HF secondary to RHD.

In this study we found that RHD was the leading cause for HF. Forty five percent of the patients admitted in medical ICU with HF had RHD which is in contrast to developed countries where coronary artery disease is the main cause of HF.

In conclusion, rheumatic heart disease causing valvular cardiac lesion leading to HF admission was still the commonest cause of HF admission in MICU in our heart centre. Despite ACC/AHA guideline suggesting use of beta-blocking agent in patients with heart failure, only 22% of our patients received that agent. Thus, many patients were not being managed fully in accordance with international evidence based guidelines.

## REFERENCES

1. LA Cubillos-Garzon, JP Casas, et al. Congestive Heart failure in Latin America: the next epidemic *Am Heart J* 2004; 147: 412-417.
2. Levy D, Larson MG, Vasan RS et al. The progression from hypertension to congestive heart failure. *JAMA*. 1996 May 22-29;275(20):1557-62.
3. Mendez GF, Cowie MR The epidemiological features of heart failure in developing countries: a review of the literature. *Int J Cardiol*. 2001 Sep-Oct;80(2-3):213-9.
4. Carapetis JR, Steer AC, Mulholland EK, Wever M. THE global burden of group A streptococcal diseases. *Lancet Infect Dis* 2005;5:685-694.
5. Bahadur KC, Sharma D, Shrestha MP, et al. Prevalence of Rheumatic and congenital heart disease in schoolchildren of Kathmandu valley in Nepal. *Indian Heart J*. 2003 Nov-Dec;55(6):615-8
6. Carapetis JR. Rheumatic heart disease in developing countries. *N Engl J Med* 2007;357:739

# Balloon Mitral Valvuloplasty (BMV) in Pregnancy: A Four-Year Experience at Shahid Gangalal National Heart Centre (SGNHC), Nepal

Regmi SR\*, Maskey A\*, DUBey L\*, Bhatt Y\*, Malla R\*, Sharma D\*, Rajbhandari R\*, Limbu YR\*, K.C. MB\*

\*Department of Cardiology Shahid Gangalal National Heart Centre, Bansbari

**Corresponding:** Dr. Shyam Raj Regmi.

Shahid gangalal National Heart Centre, Bansbari, Kathmandu, Nepal Tel:00977-1-4371322, 00977-1-4371374.

Fax 00977-1-4371123

Email: shyam\_regmi2003@yahoo.com

## Abstract

Balloon Mitral Valvuloplasty (BMV) has been performed safely during pregnancy with good results. This study was intended to see the efficacy and safety of BMV in this subset. Retrospective analysis of 22 pregnant women among a total of 861 patients who had undergone BMV for severe mitral stenosis at SGNHC from January 2003 to December 2007 were done. Mean fulroscopy time was 7.5±4.8 min. post-BMV, the mean left atrial pressure dropped from 28.12±4.3 mmHg to 15.32±6.4 mmHg. Mitral valve area as assessed by echocardiography increased from 0.76 01770.21 cm<sup>2</sup> to 1.8±0.26 cm<sup>2</sup>. all the patients showed symptomatic improvement. Six patients had an increase in MR by 2 grades. Twenty patients had a normal delevry while 2 underwent a caesarean section. There was no meternal morbidity or mortality in the peripartum period. On follow up for 26±15 months, all babies maintained normal growth and development without any thyroid disease or malignancy. During pregnancy BMV is feasible, safe and effective. Maternal and fetal outcomes are excellent. Growth and milestone of development are not affected.

**Keywords :** Balloon Mitral valvuloplasty, Pregnancy, Mitral Stenosis

## INTRODUCTION

Mitral stenosis (MS) primarily affects young women at reproductive age. Thus, pregnancy in MS patients is a common clinical problem in countries with high rheumatic disease prevalence like ours. MS contributes to significant morbidity in pregnancy. Pregnancy is associated with a 40-50% increase in cardiac outpur and a decrease in systemic vascular resistance but, in the presence of severe mitral stenosis, these changes cannot occur. Untreated, the haemodynamic effects of mitral stenosis, together with the risk of thromboembolism, can lead to significant maternal and fetal morbidity and mortality. For several decades surgical commissurotomy was being performed during pregnancy in patients with severe MS. However, BMV has been established as an effective method for treating MS in pregnancy with results comparable to surgical commissurotomy. Two BMV techniques have been extensively used: the inoue balloon technique and the transseptal over-the-wire balloon techniques. 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 benefits and is also associated with a lower risk of creating severe mitral regurgitation. However, the efficacy and safety of BMV in our subset is not known. We designed this study to evaluate the safety of BMV for the treatment of MS in pregnant women.

## METHODS

### Patients:

Eight hundred and sixty one patient underwent BMV in Shahid Gangalal National heart centre (SGNHC) in past four years (from January 2003 to December 2007), out of whom 413

(47.97%) were male and 448 (52.03%) were female. Among them 22 were pregnant women with severe mitral stenosis at 24.2±4.6 weeks of gestation (20-37 weeks) and MS was diagnosed for the first time in all. Fourteen (63.64%) were primigravidae and severe mitral stenosis was diagnosed during second (in six patient) and third (in two) pregnancy. The mean age was 23.6±4.2 years. All the patients underwent BMV after 200 weeks of gestation (20-37 weeks, mean 24.2±4.6 weeks), and all except two was in sinus rhythm. Sixteen (72.73%) patients were in NYHA class II, and 6 (27.27%) were in class III. Twelve patients had mild, and 10 patients had moderate or severe pulmonary arterial hypertension (PAH). Mild mitral regurgitation (MR) was present in 13, mild to moderate MR in 7 and moderate MR present in 2.

### Statistical methods:

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

### Cardiac catheterization and BMV technique:

BMV procedure under antibiotic coverage (Cefazolin) using local anaesthesia was done with an Inoue balloon with the standard anterograde transseptal technique. The procedure was performed in the fasting state. Special shielding was used in all the patients with their abdomen wrapped from just below the diaphragm down to the pubic symphysis by lead shields >0.5 mm thickness. Femoral venous approach was used in all cases. Unfractionated Heparin (3000 IU) 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.

Patients' clinical characteristics are shown in table 1.

Parameters	n=22
Age (years)	23.6±4.2
Gestation (weeks)	24.2±4.6
Mitral valve area (cm <sup>2</sup> )	0.76±0.21
Symptom class (NYHA)	
Class I & II	16
Class III	6
PAH	7 (44%)
Mild	12
Moderate to severe	10
LA Pressure (mmHg)	28.12±4.3
MR Nil/Grade I/II	13
Grade II/III	7
Grade III	2

NYHA: New York Heart Association, PAH: Pulmonary Artery Hypertension, LA: Left Atrium, MR: Mitral Regurgitation.

## RESULTS

The procedure was successful in all with no maternal mortality. Mean fluoroscopy time was 7.5±4.8 min. post-BMV, the mean left atrial pressure dropped from 28.12±4.3 mmHg to 15.32±6.4 mmHg. No patients was left with residual MS (MVA<1.5 cm<sup>2</sup>). Mitral valve area as assessed by echocardiography increased from 0.76±0.21 cm<sup>2</sup> to 1.8±0.26 cm<sup>2</sup>. all the patients had symptomatic improvement. Six patients had an increase in mitral regurgitation (MR) by 2 grades. One patient had a mild tear of the anterior mitral leaflet, others had excessive commissural MR. none of the 6 patients required mitral valve replacement. There was a significant reduction in the pulmonary artery pressure after BMV. Twenty patients had a normal delivery while 2 underwent a caesarean section. There was no maternal morbidity or mortality such as maternal death, abortion, or intrauterine growth retardation in the peripartum period. On follow up for 26±15 months, all babies maintained normal growth and development without any thyroid disease or malignancy.

## DISCUSSION

MS contributes to significant morbidity in pregnancy. Pregnancy is associated with a 40-50% increase in cardiac output and a decrease in systemic vascular resistance but, in the presence of severe mitral stenosis, these changes cannot occur. Untreated, the haemodynamic effects of mitral stenosis, together with the risk of thromboembolism, can lead to significant maternal and fetal morbidity and mortality. Large series of studies have proved the efficacy and safety of BMV in pregnant women with MS. As reported in other studies, in our series BMV produced impressive hemodynamic improvement including a decrease in left atrial and pulmonary artery pressure, and an increase in mitral valve area. Most of our patients had an ideal anatomy of mitral valve for BMV.

Very few complications have been reported with balloon mitral commissurotomy during pregnancy. Mitral regurgitation was increased by grade 2 in six patients in our series but none required to undergo mitral valve replacement. In one report, one patient had a spontaneous abortion. There were no maternal deaths in our series, in contrast, mortality from surgical closed mitral commissurotomy was reported to be as high as 3% and that from open commissurotomy reached 5%.

Fluoroscopic radiation exposure carries a potential risk to the unborn child. However, the risk is greatly diminished by appropriate and complete abdominal lead shielding, a short radiation exposure time, avoidance of left ventricular angiography, and performance of the procedure after the 14th week of gestation, when organogenesis has already been achieved. We, moreover, used Inoue balloon technique which seems to shorten the fluoroscopy time compared to the double balloon technique. In our study no baby had abnormalities related to radiation. Uneventful full term delivery was obtained in all patients, vaginally in 20; caesarean section was required in only two patients for obstetric reasons. There was no fetal death or preterm delivery. On follow up for 26±15 months, all babies maintained normal growth and development with no relative growth retardation. As yet, however, the long term outcome in these children remains unknown, since the future late appearance of radiation side effects cannot be excluded, though it must be very unlikely. Griem et al, in a 20 year follow up study of 1000 women irradiated for radiopelvimetry at much higher doses (15 to 30 mSv), found no difference in the incidence of cancer in comparison with a control group.

## CONCLUSION

In conclusion, BMV in pregnancy leads to marked symptomatic relief along with no immediate detrimental effects of radiation on the fetus. Thus, BMV in pregnancy is safe, feasible and effective even in the newly emerging cardiac center like ours.

## REFERENCES

1. Metcalfe J, Ueland K. Maternal cardiovascular adjustments to pregnancy. *Prog Cardiovasc Dis* 1974;16:363-74.
2. Turi ZG, Reyes VP, Raju S, et al. Percutaneous balloon versus surgical closed commissurotomy for mitral stenosis: A prospective randomized trial. *Circulation* 1991;83:1179-1185.
3. Reyes VP, Raju BS, Wyanne J, et al. Percutaneous balloon valvuloplasty percutaneous balloon valvuloplasty compared with open surgical commissurotomy for mitral stenosis. *N Eng J Med* 1994;331:961-967.
4. Hung JS, Chem MS, Wu JJ, et al. Short- and long-term results of catheter balloon percutaneous transvenous mitral commissurotomy *Am J Cardiol* 1991;67:854-862.
5. Esteves VA, Ramos AIO, Braga SLN, Harrison JK, Sousa JE. Effectiveness of percutaneous balloon mitral valvotomy during pregnancy. *Am J Cardiol* 1991;68:930-4
6. Knapp RC, Ardin LI. Closed mitral valvotomy in pregnancy. *Clin Obstet Gynecol* 1968;11:978-91.
7. EL Maraghy M, Abou Senna I, EL Tewehy F, Bassioni M, Ayoub A, EI Sayed H. Mitral valvotomy in pregnancy. *Am J Obstet Gynecol* 1983;145:708-10.
8. Vosloo S, Reichart B. The feasibility of closed mitral valvotomy in pregnancy. *J Thorac Cardiovasc Surg* 1987;93:675-9.
9. Zitnik RS, Pregnancy and open heart surgery. *Circulation* 1969;39:1257-62.

10. Szekeley P, Snaith L. The place of cardiac surgery in the management of the pregnant women with heart disease. *J Obstet Gynecol* 1973;70:69-77
11. Becker RM, Intracardiac surgery in pregnant women with heart disease. *J Obstet Gynecol* 1973;70:69-77
12. Becker RM. Intracardiac Surgery in pregnant women. *Ann Thorac Surg* 1983;36:453-8
13. Bernal JM, Mitralles PJ. Cardiac surgery with cardiopulmonary bypass during pregnancy. *Obstet Gynecol Surv* 1986;41:1-6
14. patel JJ, Mitha AS, Hassen F, Patel N, Naidu R, Chetty S, et al. Percutaneous balloon mitral valvotomy in pregnant patients with tight pliable mitral stenosis. *Am Heart J* 1993;125:1106-9.
15. Griem ML, Meier P, Dobben GD. Analysis of the morbidity and mortality of children irradiated in fetal life. *Radiology* 1967;88:374-9.