

Percutaneous Transvenous Mitral Commissurotomy in Elderly Mitral Stenosis Patients. A Retrospective Study at Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal

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ABSTRACT

Introduction: Percutaneous transvenous Mitral Commissurotomy (PTMC) has been shown to be a valid alternative to surgical therapy in selected patients with mitral stenosis. Though its efficacy in children and young adults is already established, its role in elderly patients is not well reported. We aimed to evaluate the efficacy of PTMC in elderly patients (≥ 60 years).

Methods: All elderly patients who underwent PTMC from March 2008 to March 2013 were retrospectively reviewed. Mitral valve area and mean left atrial pressure before and after the procedure were compared.

Results: During the study period 49 elderly patients underwent PTMC. Thirty eight were female and 11 male. Age ranged from 60 to 77 years with the mean age of 64.5 ± 4.0 years. The mean mitral valve area increased from $0.9 \pm 0.1 \text{ cm}^2$ to $1.6 \pm 0.3 \text{ cm}^2$ whereas mean left atrial pressure decreased from $25.4 \pm 6.6 \text{ mmHg}$ to 12.9 ± 4.5 . Successful results were observed in 41 (83.6%) patients. Unsuccessful results were due to suboptimal mitral valve area $< 1.5 \text{ cm}^2$ in 7 (14.25%) patients and post-procedure MR of more than moderate MR in 1(2%) patients. Unsuccessful PTMC was much more common in severe than in moderate mitral stenosis.

Conclusions: Our study suggests that PTMC in elderly is a safe and effective procedure when performed in experienced centre by experienced operators.

Keywords: elderly, percutaneous transvenous mitral commissurotomy, mitral stenosis

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Article received on the 27th of August 2013. Article accepted on the 27th of October 2013.

INTRODUCTION

Mitral stenosis (MS) is one of the common long term complications of rheumatic fever (1). Based upon the nature and severity of MS, patients can be managed with medical management, percutaneous transvenous mitral commissurotomy (PTMC) or surgery. PTMC has revolutionized the treatment of patients with symptomatic MS and is now established as the procedure of choice. Since 1984 it has been shown to be a valid alternative to surgical therapy in selected patients with MS (2). Its clinical applications has been widely accepted and a large series has been reported (3). It also confers equivalent results to open and closed surgical valvotomy in patients whose valves are anatomically suitable (4-6).

An increasing interest in this method has resulted in its widening application to situations that would not generally have been considered for surgical commissurotomy, such as in elderly patients with calcific MS (7,8). PTMC 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 PTMC in the absence of left atrial thrombus or moderate to severe MR (9). Though its efficacy using Inoue balloon in children and young adults is already established, its role in elderly patients is not well reported. We designed this study to evaluate the efficacy of PTMC in elderly patients (≥ 60 years). □

METHODS

It is a retrospective, single centre study, performed at Shahid Gangalal National Heart Centre, Bansbari, Kathmandu, Nepal. Medical records of all elderly patients who underwent elective PTMC from March 2007 to March 2013 were retrospectively reviewed. One patient who underwent PTMC was excluded from the study as he underwent rescue PTMC. During the study period 2750 PTMC were done. PTMC of elderly compromise of (49 cases) less than two percent of PTMC done in the study period (lesser patient less patients population is due to lower number in this age has suitable mitral valve for PTMC. Performa was designed to collect patient information which included; age, gender, medication, pulmonary

artery systolic pressure, left atrium (LA) size, rhythm, mitral valve area (MVA) and mean LA pressure before and after PTMC. Elderly patients with symptomatic MS and MVA less than 1.5 cm^2 with favourable mitral valve morphology were included. Patients have more than moderate mitral regurgitation (MR), having other significant valve lesions requiring surgical treatment, or evidence of left atrial thrombus was excluded. In patient taking anticoagulant PT/INR was checked on the day of PTMC. Patients underwent PTMC only when PT/INR was below 1.5 to decrease the risk of bleeding.

Procedure: PTMC was done with all aseptic condition through right femoral venous approach under local anaesthesia. Before and after the balloon inflation means LA pressure was recorded. A simple balloon sizing method, based on the body height, for selection of and appropriate sized balloon catheter was determined using following formula.

$$\text{Balloon size (mm)} = \frac{\text{Height (cm)}}{10} + 10$$

Pre and post procedural Echocardiography evaluation: 2 D echo, colour flow mapping and MVA calculation using planimetry was done before and after PTMC to evaluate MVA, and MR. A trans-oesophageal echocardiography (TEE) was done one day before the PTMC to rule out the presence of LA and left atrial appendage thrombus. Before discharge (next day after the procedure) echocardiograph was done to evaluate the MVA and MR.

Successful PTMC was defined as increase in $\text{MVA} > 1.5 \text{ cm}^2$ without more than moderate MR. Complications like cardiac tamponade, mitral regurgitation, CVA and acute pulmonary oedema were recorded. □

RESULTS

We studied 49 patients of which 38 were female and 11 male. A clear female predominance was observed in this series with female to male ratio of 3.4:1. The patient had the age range of 60 to 77 years with the mean age of 64.5 ± 4.0 years. Shortness of breath as symptom was present in all the patients. Five patients (10.2%) were admitted for NYHA Class IV before the procedure, rest of them (89.8%)

were in NYHA II to III (comment all the patients are symptomatic). All patients were taking diuretics in different doses to control the symptom. Electrocardiography (ECG) findings were normal sinus rhythm in 19 (38.7%) patients and atrial fibrillation in 30 (61.3%) patients. Patients with atrial fibrillation were taking aspirin or warfarin. Left atrial size range from 3.6 cm to 8.8 cm with the mean of 5.5 ± 1.2 cm. Normal LA size of less than 4 cm was present in 5 (10.2%) patients. Severe MS was present in 26 (53.1%) patients whereas moderate MS was present in 23 (46.9%) patients. Mild MR was present in 29 (59.1%) patients, moderate MR in one (2%) patient, trace MR in 6 (12.2%) patients whereas rest 26.7% patient don't have any MR. Ten (20.4%) patient had moderate (>50 mmHg) pulmonary artery systolic pressure (PASP) and 9 (18.3%) patients had severe PASP (>70 mmHg), Mean PASP was 55.1 ± 24.7 mmHg.

The mean Mitral valve area increased 0.9 ± 0.1 cm² to 1.6 ± 0.3 following PTMC. Mean left atrial pressure decreased from their pre-PTMC state of 25.4 ± 6.6 mmHg to 12.9 ± 4.5 as shown in Table 2.

Severe MR occurred in one patient. Successful results were observed in 41 (83.6%) patients compared to unsuccessful results in 8 patients. Unsuccessful results were due to suboptimal MVA <1.5 cm² in 7 (14.25) patients and post-procedure MR of more than moderate MR in 1(2%) patient. Unsuccessful PTMC was much more common in severe MS group than in Moderate MS group as shown in the Table 3.

There were Post PTMC there was two moderate MR after PTMC but we don't have any other complications like death, pericardial effusion. □

DISCUSSIONS

Mitral stenosis is one of the commonest long term complications of rheumatic fever PTMC has become a very popular technique over time to relieve symptom for selected patients with moderate to severe mitral stenosis, since the introduction of the procedure by Inoue et al. in 1984 (10). The procedure involves passing a balloon catheter from the right atrium through the interatrial septum into the left atrium and then across the stenotic mitral valve into the left ventricle. Inflation of the bal-

loon mechanically splits the fused commissures. The immediate results of PTMC are similar to those of closed and open surgical mitral commissurotomy (11).

Though PTMC is recommended as a Class I indication for symptomatic patients in the absence of contraindication (9). But in elderly valve are deformed and are less suitable for balloon dilatation. Moreover in advanced age the LVEF also declines due to chronic rheumatic carditis which adversely affects the outcome (12).

In our study MS is predominantly presents in female which is similar to the study done in South Asian region and in Iran (13).

The mean valve area usually doubles, with a 50% to 60% reduction in transmitral gradient. Overall, 80% to 95% of the patients may have a successful procedure, which is defined as mitral valve area >1.5 cm² in the absence of complications (14). Our success rate to 83.6% is comparable to international studies done in children and adults.

A small study in elderly with 13 patients in Japan had shown that, PTMC has the advantages of shorter hospitalization and lower invasion for the patients compared with surgery (15) PTMC is an effective treatment in both elderly and young groups. Elderly patients with severe mitral stenosis have higher risk of PTMC and are needed discrete strategy.

	n	%
Male	11	22.4
Female	38	77.6
NYHA IV	5	10.2
NYHA II- III	44	89.8
Normal LA size	5	10.2
Dilated LA size	44	89.8
MR	36	73.4
MR absent	13	26.6

TABLE 1. Demographics.

Variables	Before PTMC	After PTMC	P
MVA (cm ²)	0.9 ± 0.1	1.6 ± 0.3	0.001
Mean LA pressure mm HG	25.4 ± 6.6	12.9 ± 4.5	0.001

TABLE 2. Changes in MVA and mean left atrial pressure following PTMC.

	total	Successful	Unsuccessful
Severe MS	26	20 (76.9)	6 (23.1)
Moderate MS	23	21 (91.3)	2 (8.7)
Overall	49	41 (83.6)	8 (16.4)

TABLE 3. Success rate in MS.

MR severity may increase in 25-83% of cases (16-18). This well recognized complication is usually mild and well tolerated but may give rise to the production of significant MR in 2-19% of patients with the need for valve replacement in a few patients (19-21).

The rate of serious complications in our study is low and only one patient had severe MR after the procedure which is comparable to other studies. This may be due to our approach of step wise dilatation of mitral valve and selection of patients with suitable valvular anatomy for balloon dilation, which are proven ways to prevent severe MR (22).

Though the rate of embolic events has been reported as between 0.3% and 3% with standard protocols using heparin during the procedure (23-26). But in our study we don't have this complication.

Limitation of the study

It is a retrospective, single centre study. We could not do a long term follow up in this study.



CONCLUSIONS

The present study shows an excellent outcome of PTMC in term of safety and efficacy in elderly MS patients when performed in experienced centre by experienced operators.

Conflict of interests: none declared.

Financial Support: none declared.

Acknowledgement: The authors would like to thank cathlab staff of Shahid Gangalal National Heart Centre for data keeping, which was useful for our research.

REFERENCES

1. Olson LJ, Subramanian R, Ackermann DM – Surgical pathology of the mitral valve; a study of 712 cases spanning 21 years. *Mayo clinics proc* 1987; 62:22-7
2. Inoue K, Owaki T, Nakamura T, et al. – Clinical application of transvenous mitral commissurotomy by a new balloon catheter. *J Thoracic Cardiovasc Surg* 1984; 87:394-402
3. Nobuyoshi M, Hamasaki N, Kimura T, et al. – Indication, complications, and short-term clinical outcome of percutaneous transvenous mitral commissurotomy. *Circulation* 1989; 80:782-92
4. Farhat MB, Ayari M, Maatouk F, et al. – Percutaneous balloon versus surgical closed and open mitral commissurotomy: seven-year follow-up results of a randomized trial. *Circulation* 1998; 97:245-250
5. Turi ZG, Reyes VP, Raju BS, et al. – Percutaneous balloon versus surgical closed commissurotomy for mitral stenosis. A prospective, randomized trial. *Circulation* 1991; 83:1179-1185
6. Reyes VP, Raju BS, Wynne J, et al. – Percutaneous balloon valvuloplasty compared with open surgical commissurotomy for mitral stenosis. *N Engl J Med* 1994; 331:961-967
7. McKay RG, Lock JE, Keane JF, et al. – Percutaneous mitral valvuloplasty in an adult patient with calcific mitral stenosis. *J Am Coll Cardiol.* 1986; 7:1410-5
8. Kaul UA, Singh S, Kalra GS, et al. – Mitral regurgitation following percutaneous transvenous mitral commissurotomy: a single-center experience. *J Heart Valve Dis.* 2000; 9:262-8
9. Robert OB, Blasé AC, Kanu C, et al. – 2008 focused update incorporated into the ACC/AHA 2006 guidelines for the management of patients with valvular heart disease: A report of the American college of cardiology / American heart association task force on practice guidelines (writing committee to revise the 1998 guidelines for the management of patients with valvular heart disease. *J Am. Coll. Cardiol.* 2008; 52:e1-e142
10. Inoe J, Owaki T, Nakamura T, et al. – Clinical application of transvenous mitral commissurotomy by a new balloon catheter. *J Thoracic Cardiovasc Surg* 1984; 87:394
11. Patel JJ, Shama D, Mitha AS, et al. – Balloon Valvuloplasty versus closed Commissurotomy for pliable mitral stenosis: a prospective hemodynamic study. *J Am. Coll. Cardiol.* 1991; 18:1318-1322
12. Hikmatullah J, Mahmoodul H, Muhammad H – Long term Echocardiographic follow up of Percutaneous transvenous mitral commissurotomy. *JPMI* 18:528-534
13. Sadeghian H, Salarifar M, Rezvanfard M, et al. – Percutaneous Transvenous Mitral Commissurotomy: Significance of Echocardiographic Assessment in Prediction of Immediate Result. *Arch Iran Med.* 2012; 15:629-634
14. Yonga GO, Bonhoeffer P – Percutaneous transvenous mitral commissurotomy in juvenile mitral stenosis. *East African Medical Journal* 2003; 80:172-74
15. Tsuchioka Y, Yamagata T, Matsuura H, et al. – Percutaneous transvenous mitral commissurotomy in elderly patients with mitral stenosis. *Nihon Ronen Igakkai Zasshi.* 1993; 30:688-92
16. Arora R, Kalra GS, Singh S, et al. – Percutaneous transvenous mitral commissurotomy: immediate and long-term follow-up results. *Cathet Cardiovasc Diagn.* 2002; 55:450-456
17. Nobuyoshi M, Hamasaki N, Kimura T, et al. – Indications, complications, and short-term clinical outcome of percutaneous transvenous mitral commissurotomy. *Circulation* 1989; 80:782-792
18. Essop MR, Wisenbaugh T, Skoularigis J, et al. – Mitral regurgitation following mitral balloon valvotomy. Differing mechanisms for severe versus mild-to-moderate lesions. *Circulation* 1991; 84:1669-1679
19. Vahanian A – Percutaneous mitral commissurotomy. *Eur Heart J.* 1996; 17:1465
20. Harrison JK, Wilson JS, Hearne SE, et al. – Complications related to percutaneous transvenous mitral commissurotomy. *Cathet Cardiovasc Diagn.* 1994; Suppl 2:52-60
21. Krishnamoorthy KM, Radhakrishnan S, Shrivastava S – Natural history and predictors of moderate mitral regurgitation following balloon mitral valvulo-

- plasty using Inoue balloon. *Int J Cardiol.* 2003; 87:31-36
22. **Lau KW, Gao W, Ding ZP, et al.**
– Immediate and long-term results of percutaneous Inoue balloon mitral commissurotomy with use of a simple height-derived balloon sizing method for the stepwise dilation technique. *Mayo Clin Proc.* 1996; 71:556-63
23. **Iung B, Cormier B, Ducimetiere P, et al.** – Immediate results of percutaneous mitral commissurotomy. A predictive model on a series of 1,514 patients. *Circulation* 1996; 94:2124-2130
24. The National Heart, Lung, and Blood Institute Balloon Valvuloplasty Registry Participants. Multicenter experience with balloon mitral commissurotomy. NHLBI Balloon Valvuloplasty Registry Report on immediate and 30-day follow-up results. *Circulation* 1992; 85:448-461
25. **Arora R, Kalra GS, Murty GS, et al.**
– Percutaneous transatrial mitral commissurotomy: immediate and intermediate results. *J Am Coll Cardiol* 1994; 23:1327-1332
26. **Chen CR, Cheng TO** – Percutaneous balloon mitral valvuloplasty by the Inoue technique: a multicenter study of 4,832 patients in China. *Am Heart J* 1995; 129:1197-203.