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IMMEDIATE OUTCOMES OF PERCUTANEOUS TRANSVENOUS MITRAL COMMISSUROTOMY OF PATIENTS WITHSEVERE MITRAL STENOSIS IN DIFFERENT AGE GROUPS

Muzaffar Ali[1], Usman Mahmood Butt[2] , Zubair Akram[3]

[1,3] Department of Cardiology, Allamaiqbal Medical College/Jinnah Hospital, Lahore, Pakistan

Address for Correspondence:

Muzaffar Ali,

Department of Cardiology, Allamaiqbal Medical College/Jinnah Hospital, Lahore, Pakistan

E-Mail: mzra750@hotmail.com

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ABSTRACT

Objectives: To evaluate the immediate outcomes of PTMC for severe mitral valve stenosis

Methodology: This cross sectional study was conducted from January 2015 to December 2015 at Cardiology Department Jinnah hospital Lahore. Patients with severe mitral valve stenosis having Mitral valve area (MVA) $\leqslant$ 1.0 cm^2 who underwent PTMC with suitable valve morphology. All patients underwent PTMC using the transseptal antegrade technique, after informed consent was obtained. Echocardiography was performed in all patients before and after PTMC to assess the severity of mitral regurgitation. Patients were divided in two groups based on younger < 35 years and older age (36 - 60 y) and comparison was made to assess difference before and after intervention. Independent t-test and Chi-square test was used to assess difference in severity of Mitral stenosis before and after PTMC in different age groups with $p<0.05$ as statistical significant.

Results: A total of 60 subjects with severe mitral stenosis underwent PTMC. Mean age was 29.98 ± 10.824 years.The younger group <35 years were 68.3 % and 31.7% were older between 36-60 years. There were 88.3% female. Mean pre and post PTMC MVA was 0.83 ± 0.133 and 1.53 ± 0.383 cm^2 ($t = 2.172$ $p < .034$) respectively. Similarly mean pre and post PTMC MVPG was 27.20 ± 6.802 and 12.88 ± 6.3813 ($t = 4.591$ $p < .000$). The success rate of the PTMC was significantly higher among 10-35 years 87.8% than 36-60 years 52.7 % ($X^2 = 8.979$ $p = .003$)

Conclusion: PTMC is a safe and effective treatment for patients with severe MS who have suitable valve morphology especially in younger age.

Key Words: Mitral Stenosis, PTMC, Mitral Valve Area, Mitral Regurgitation

INTRODUCTION

Mitral stenosis (MS) is one of the most well established long term complications of rheumatic fever.[1] Depending upon the symptoms of the patient, nature, severity of MS and valve morphology, these patients can be treated with medical management, percutaneous transvenous mitral commissurotomy (PTMC) or surgical replacement of the valve. PTMC has reformed the treatment strategy of patients with symptomatic severe MS and is now recognized as the procedure of choice depending upon the suitability for it. Started from 1984 it has been shown to be an effective substitute to surgical therapy in selected patients with severe MS.[2] The clinical applications of this procedure has been widely acknowledged and a large series of studies has been reported on it.[3] Even PTMC shows the results equivalent to open and closed surgical valvotomy in patients whose valves are anatomically suitable for the procedure.[4-6]

Recently an increasing interest in this procedure has brought about more wide application of PTMC to situations that would not generally have been considered suitable for surgical commissurotomy, such as in elderly patients with calcific MS, where surgical risk thought to be high.[7,8] According to 2014 AHA/ACC Guideline for the management of patients with valvular heart disease PTMC is recommended as a Class I indication for symptomatic patients with severe MS (mitral valve area $\leqslant 1.5$ cm^2) and favorable valve morphology in the absence of left atrial thrombus or moderate to severe MR.[9] Although its effectiveness using Inoue balloon in children and young adults is already well-known, its success in elderly patients is not well described. Though PTMC (Percutaneous mitral balloon commissurotomy) is reasonable for asymptomatic patients with very severe MS (mitral valve area $\leqslant 1.0$ cm^2) and favorable valve morphology in the absence of left atrial thrombus or moderate to severe MR. But in elderly patients valves are deformed and are less suitable for balloon dilatation. Furthermore with increasing age the left ventricular Ejection Fraction (LVEF) also drops due to chronic rheumatic carditis which unfavorably affects the outcome of the procedure.[10]

The echocardiographic evaluation of mitral valve is presently the most widely used method for the selection of PTMC candidates. The immediate outcomes of this procedure have shown to be more superior in patients of MS with low Echocardiographic score.[11] Several studies in the western societies have shown the successful outcomes of PTMC in patients of severe MS but in our part of the world only lesser data is available about it. This study aims to evaluate the immediate outcomes of PTMC for very severe mitral valve stenosis and success of the procedure in different age groups at Jinnah Hospital Lahore.

METHODOLOGY

This non randomized cross sectional study was conducted at Cardiology Department Jinnah Hospital Lahore from January 2010 to December 2015. The patients with very severe mitral valve stenosis defined as Mitral valve area (MVA) $\leqslant 1.0$ cm^2 who underwent PTMC with suitable valve morphology (no LA appendage Clot and MR > 2+ on echocardiography) were included in our study through non probability / purposive sampling. After an informed consent all patients underwent PTMC using the transseptal antegrade technique. The Inoue technique was used with these patients. The maximum volume of the Inoue balloon used was determined by the equation: maximum balloon volume (mm) = (patient's height (cm)/10) + 10. Echocardiography was performed in all patients before and after PTMC to assess the severity of mitral regurgitation. Successful outcome of PTMC was defined as a post- PTMC mitral valve area more than double of baseline area, 50% reduction in MVPG (mean) after PTMC and without >2+ increase in the severity of mitral regurgitation post- PTMC. Baseline demographic characters like age, sex and MVA, MVPG, and severity of pre and post mitral stenosis was measured in all patients. Patients were divided in two groups based on younger < 35 years and older age (36 - 60 y) and comparison was made to assess difference before and and after intervention. An independent t test and was used to compare MVA and MVPG and Chi-square test was used to assess difference in severity of Mitral regurgitation with $p < .05$ as statistical significant.

RESULTS

A total of 60 subjects with severe mitral stenosis underwent PTMC. Mean age was 29.98 ± 10.824 years. The younger group <35 years were 68.3 % and 31.7% were older between 36-60 years. There were 88.3% female and 11.7% were male patients. Mean Pre and Post PTMC MVA was 0.83± 0.133 and 1.53± .383 cm^2 ($t = 2.172$ $p < .034$) respectively while mean pre and post PTMC MVPG was 27.20 ± 6.802 and 12.88 ±6.3813 ($t=4.591$ $p<.000$). Pre and post PTMC MVA were compared among two age groups < 35 years and > 35 years. Mean Pre PTMC MVA

Table 1: Baseline Characteristics

	Frequency	%age	Mean	SD	t test	P value
Age	-	-	29.98	10.824	-	-
36 - 60 years	41	68.3	-	-	-	-
10 - 35 years	19	31.7	-	-	-	-
Gender	-	-	-	-	-	-
Male	7	11.6	-	-	-	-
Female	53	88.4	-	-	-	-

Table 2: Comparison of PTMC Parameters Among Different Age Group

	Group years	N	Mean	SD	t test	P value
Pre PTMC MVA cm^2	10 - 35	41	.85	.133	2.172	.034
	36 - 60	19	.77	.119		
Post PTMC MVA cm^2	10 - 35	41	1.66	.346	4.591	.000
	36 - 60	19	1.24	.293		
Pre PTMC MVPG mmHg	10 - 35	41	26.83	7.190	-.617	.540
	36 - 60	19	28.00	5.981		
Post PTMC MVPG mm Hg	10 - 35	41	10.83	5.500	-4.132	.000
	36 - 60	19	17.32	5.991		

among younger(10 - 35) years was 0.85 ±0.133. and among older(36 - 60) years was 0.77 ±0.119. (t = 2.172 p < .034). Mean post PTMC MVA among 10 - 35 years was 1.66 ±0.346, and among 36-60 years was 1.24±0.293 cm^2. (t = 4.591 p < .000). Mean pre PTMC MVPG among younger patients was 26.83 ± 7.190, and among older patients was 28.0 ± 5.981 mmHg. Similarly Mean post PTMC MVPG was 10.83 ± 5.50, and 17.32 ± 5.891 in younger and older patients respectively (t=-4132 p < .000). No patient developed significant Post PTMC MR(>2+) in any age group. The success rate of the PTMC was significantly higher among younger age(10-35 years) 87.8% than older (36-60 years) 52.7% (X^2 =8.979 p =.003).

DISCUSSION

Cardiologists have acknowledged that Mitral stenosis (MS) is one of the most well established long term complications in patients of rheumatic fever and about one fourth of

Table 3: Comparison of Pre and Post PTMC Mitral Regurgitation

	Severity	Pre PTMC MR		Post PTMC MR		Chi square P value
		Frequency	Percent	Frequency	Percent	
Baseline	No	51	85.0	37	61.7	X^2 = 34.885 P = .000
	+ 1	9	15.0	14	23.3	
	+ 2	0	0.0	9	15.0	
	Total	60	100.0	60	100.0	
Age Groups						
10 - 35 years	No	38	92.7	33	80.5	X^2 =5.994 P =.014
	+ 1	3	7.3	5	12.2	
	+ 2	0	0.0	3	7.3	
36 - 60 years	No	13	68.4	4	21.1	X^2 =19.416 P =.000
	+ 1	6	31.6	9	47.4	
	+2	0	0	6	31.6	

Table 4 : Success Rate Of PTMC in Different Age Groups

Age Group Years	Success	Frequency	Percentage	Chi square P value
10 - 35	Yes	36	87.8	X^2 =8.979 P =.003
	No	5	12.2	
36 - 60	Yes	10	52.7	
	No	9	47.3	

rheumatic heart disease (RHD) patients have alone MS.[1] The present study demonstrates the immediate outcomes of PTMC in patients with very severe MS. Our study was appropriate and cost effective as we involved those patients admitted or seen on outdoor basis. Our study found the successful immediate outcomes of PTMC in terms of significant increase in MVA from 0.83 to 1.53 cm^2 and significant reduction in MVPG (mean) from 27.20 to 12.88 mmHg in patients with very severe MS. In a study conducted by Taimur et al, showed similar trends in terms of significant increase in MVA from 0.83 to 2.0 cm^2 and significant reduction in MVPG (mean) from 15.1 to 4.0 mmHg.[12] In a local study done by Ahmad Noor et al, showed same results in terms of determinants of Pulmonary Hypertension in patients of Mitral stenosis.[13]

PTMC is now becoming a regular procedure for treatment in patients with severe mitral stenosis whether symptomatic or asymptomatic patients according to 2014 AHA guidelines. Even the results are comparable to surgical commissurotomy.[14] The success of the procedure depends upon the depends upon various factors including age, valve morphology and Wilkin score. Now it is also being performed in those patients who are at high risk for surgical procedure.

The incidence of complications of the procedure which include cerebrovascular accidents, cardiac tamponade, procedure related death and Mitral regurgitation (MR> 2+) is very low as showed in many studies.[14] The most important complication is significant post PTMC MR > 2+. In our study no patient developed significant MR which was another indicator of the success of the procedure. While study by Taimur et al, showed incidence of significant post PTMC MR around 1.7% which required emergency mitral valve replacement.[12] The important mechanism of this complication is either tear of mitral leaflet or chordae. But mostly patients develop only insignificant post PTMC MR and remain asymptomatic.[8] And in most of these patients MR either decrease or disappear with the passage of time.

Age is another important factor in the success of PTMC procedure. With increasing age mitral valve become more

deformed structurally and less suitable for PTMC. Our study showed success rate of the PTMC was significantly higher in younger patients (10-35 years) 87.8% than old age patients (36-60 years) 52.7 % (X^2 =8.979 p = 0.003). Similar results of decreasing success rate of PTMC with advancing age were shown in a study done by Hikmatullah Jan et al.[10] With old age the decreasing LVEF further compromise the success of the procedure. On the other hand a study by Chandra Mani Adhikari showed PTMC in elderly is a safe and effective procedure when performed in experienced Centre by experienced operators.[15]

CONCLUSION

PTMC is a safe and effective treatment for patients with severe MS who have suitable valve morphology especially in younger age. The successful immediate outcomes of PTMC in patients with very severe mitral stenosis as revealed by our study requires larger scale studies for the validation of these results as mitral stenosis is an important disease burden in our part of the world.

REFERENCES

1. Olson LJ, Subramanian R, Ackermann DM, Orszulak TA, Edwards WD. Surgical pathology of the mitral valve: a study of 712 cases spanning 21 years. Mayo Clin Proc 1987;62:22-7.
2. Inoue K, Owaki T, Nakamura T, Kitamura F, Miyamoto N. 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, Nosaka H, Yokoi H, Yasumoto H, et al. Indication, complications, and short-term clinical outcome of percutaneous tranvenous mitral comissurotomy. Circul 1989;80:782-92.
4. Ben Farhat M, Ayari M, Maatouk F, Betbout F, Gamra H, Jarra M, et al. Percutaneous balloon versus surgical closed and open mitral commissurotomy: seven-year follow-up results of a randomized trial. Circul 1998;97:245-50.
5. Turi ZG, Reyes VP, Raju BS, Raju AR, Kumar DN, Rajagopal P, et al. Percutaneous balloon versus surgical closed commissurotomy for mitralstenosis. A prospective, randomized trial. Circul 1991;83:1179-85.
6. Reyes VP, Raju BS, Wynne J, Stephenson LW, Raju R, Fromm BS, et al. Percutaneous balloon valvuloplasty compared with open surgical commissurotomy for mitral stenosis. N Engl J Med 1994;331:961-7.
7. Mckay RG, Lock JE, Keane JF, Safian RD, Aroesty JM, Grossman W. 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, Nair M, Mohan JC, Nigam M, et al. Mitral regurgitation following percutaneous transvenous mitral commissurotomy: a single-center experience. J Heart Valve Dis 2000;9:262-6.
9. Bonow RO, Carabello BA, Chatterjee K, de Leon AC Jr, Faxon DP, Freed MD, 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. Jan HU, Hassan M, Hafizullah M. Long term echocardiographic follow up of percutaneous transvenous mitral commissurotomy. J Postgrad Med Inst 2004;18:528-34.
11. Kabir MS, Majumder AS, Bari MS, Chowdhury AW, Haque SS, et al. Echo scoring involving the individual parameter without total echo scoring may be the determining factor for the immediate outcome of the results of percutaneous transluminal mitral commissurotomy. Dinajpur Med Coll J 2009;2:17-22.
12. Taimur SD, Karim R, Haq MM, Khan SR. Percutaneous transvenous mitral commissurotomy: in-hospital outcomes of patients with mitral stenosis. Ibrahim Card Med J 2011;1:24-8.
13. Noor A, Saghir T, Zaman KS. Determinants of decrease in pulmonary hypertension following percutaneous transvenous mitral commissurotomy. J Coll Physicians Surg Pak 2009;19:81-5.
14. Fawzy ME, Mimish L, Sivanandam V, Lingamanaicker J, al-Amri M, Khan B, et al. Advantage of inoue balloon catheter in mitral balloon valvotomy: experience with 220 consecutive patients. Cathet Cardiovasc Diagn 1996;38:9-14.
15. Adhikari CM, Malla R, Rajbhandari R, Bhatta YK, Maskey A, et al. Percutaneous transvenous mitral commissurotomy in elderly mitral stenosis patients. A retrospective study at shahidgangalal national heart centre, Bansbari, Kathmandu, Nepal. Maedica (Buchar) 2013;8:333-7.