Original Article

Pak Armed Forces Med J 2016; 66(Suppl):S26-29

OUTCOME OF PERCUTANEOUS MITRAL VALVE COMMISSUROTOMY ON MITRAL VALVE AREA , PULMONARY HYPERTENSION AND DYSPNEA CLASS

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ABSTRACT

Objective: To assess the effectiveness of Percutaneous Mitral valve Commissurotomy on mitral valve area, pulmonary hypertension and NYHA dyspnea class in patients with mitral stenosis.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Adult Cardiology departments of AFIC &NIHD from 1st January 2014 till 31st December, 2015.

Material and Methods: Seventy Three patients with severe mitral stenosis were included in the study that underwent PTMC using consecutive sampling technique. The procedural success of PTMC was noted by measuring mitral valve area through planimetry method by 2D Echocardiography in 24 hours after PTMC.

Results: There were 44 (60.3%) females and 29 (39.7%) males in the study, with mean age 35.75 ± 9.4 years. Mean NHYA dyspnea class of the patients before PTMC was 2.51 ± 0.7 and after PTMC mean NYHA Class became 1.34 ± 0.51. Mean pulmonary hypertension of the patients before PTMC was 52.45 ± 15.6mm Hg and after PTMC mean pulmonary hypertension was 44.58 ± 15.29mm Hg. Mean mitral valve area of the patients, before PTMC was 0.81 ± 0.19cm2 and after PTMC, mean mitral valve area became 1.52 ± 0.16 cm2. Paired samples t-test was used to assess the effectiveness of PTMC. The result was found to be statistical significant ($p < 0.001$) with respect to NYHA class of dyspnea, pulmonary hypertension and mitral valve area.

Conclusion: The procedural success of PTMC is high and it is a safe procedure as well. It should be offered to the patients with mitral stenosis who are filling the criteria for PTMC and unfit for surgery.

Keywords: Percutaneous Mitral valve Commissurotomy, Mitral Stenosis, NYHA Dyspnea Class, Pulmonary Hypertension.

INTRODUCTION

Mitral stenosis is common disease in Asian people. It results from post bacterial complication. It is more common in females as compared to males. The symptoms of mitral stenosis occur in 2nd or 3rd decades of life. Mitral Stenosis is due to thickening and immobility of the mitral valve leaflets resulting in obstruction of blood flow from the left atrium to the left ventricle[1]. Mitral Stenosis is the most common complication of rheumatic fever and accounts for 25% cases with pure Mitral Stenosis[2].There are different modalities of treatment available for mitral stenosis. With the introduction of surgery and Percutaneous mitral valve commissurotomy (PTMC) the natural history of mitral stenosis has markedly altered. Percutaneous mitral valve commissurotomy has replaced surgical commissurotomy as a treatment of choice in patient with chronic rheumatic mitral valve disease. Various randomized trials have shown PTMC to be equal or superior to surgical commissurotomy in terms of hemodynamic improvement as well as long term survival. Pulmonary artery systolic pressure decreased significantly after PTMC with corresponding increase in Mitral Valve Area (MVA) although medical therapy can relieve symptoms, it does not affect the obstruction to flow[3].

Initially, surgical therapy (open and close mitral commissurotomy or mitral valve repair) were the only methods by which mitral stenosis could be corrected. However, the development of percutaneous mitral balloon valvotomy (PMBV) by Inoue in 1984, it emerged as a treatment of choice for selected patients with mitral valve stenosis[4]. Then Percutaneous

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approach became the therapy of choice for suitable valves after introduction of Percutaneous balloon dilatation techniques as described by Inoue in 1984 and Lock et al in 1985[5,6].

Mitral stenosis leads to different complication and about one half of patient have one or more episode of acute deterioration of patient with mitral stenosis need intervention, 50% of the patients have moderate pulmonary hypertension while 25% of the patients have severe pulmonary hypertension[10,12]. Pulmonary hypertension significantly influences symptomatology and long-term prognosis[13]. Mitral valve replacement, surgical or percutaneous balloon mitral commissurotomy

Table-1: Pre and post PMTC class of dyspnea.

Groups	Mean ± S.D	*p*-value
Pre-PTMC NYHA class of dyspnea (n=73)	2.51 ± 0.71	0.001
Post-PTMC NYHA class of dyspnea (n=73)	1.34 ± 0.51	

Table-2: Pre and Post PTMC Pulmonary Hypertension.

Groups	Mean ± S.D	*p*-value
Pre-PTMC pulmonary hypertension (n=73)	52.45 ± 15.63	0.001
Post-PTMC pulmonary hypertension (n=73)	44.58 ± 15.29	

Table-3: Pre and post PTMC mitral valve area.

Groups	Mean ± S.D	*p*-value
Pre-PTMC mitral valve area (n=73)	0.81 ± 0.19	< 0.001
Post-PTMC mitral valve area (n=73)	1.52 ± 0.16	

symptoms due to complications[7]. These complication include atrial fibrillation, thromboembolism, pulmonary edema, pulmonary hypertension, infective endocarditis, right heart failure and rarely at later stage left ventricular failure. The patient of mitral stenosis eventually have disabling symptoms like dyspnea, orthopnea, paroxysmal nocturnal dyspnea, chest pain, palpitations, fatigue, weakness, thromboembolism, arrhythmia and sign of right heart failure like edema, ascites, increase JVD, hepatomegaly[8].

Progressive mitral stenosis is associated with gradual loss of mitral valve area. An orifice area of ≤ 1 cm2 is considered to represent critical mitral stenosis and is associated with a significant pressure gradient that is necessary to maintain adequate filling of the left ventricle. The rate of valve area loss is 0.1cm2 /year[9]. The loss of valve area cannot be predicted from initial valve area[10]. In general, a valve area of < 2.5 cm2 must be present before exertional dyspnea can be attributed to mitral stenosis; a valve area of < 1.5 cm2 is usually required to produce symptoms at rest[11].

Pulmonary hypertension is a common complication of mitral stenosis. At a stage when often results in regression of pulmonary hypertension.14 The improvement in pulmonary hypertension after PTMC is explained by the improvement in the mitral valve area and subsequent decompression of left atrium and pulmonary venous beds[1,15].

MATERIAL AND METHODS

Descriptive cross-sectional study was carried out at Armed forces Institute of Cardiology Rawalpindi from 1st January 2014 till 31st December, 2015. A total of 73 patients with Severe Mitral Stenosis were included in the study, who were filling the criteria for PTMC (unfit for the surgery) using consecutive sampling technique. The procedural success of Percutaneous Mitral valve Commissurotomy (PTMC) was noted by measuring Mitral valve area through Planimetry Method by 2D Echocardiography in twenty four hours after PTMC. Data collection tool was used to collect the different variables. When data was analyzed using SPSS 21 Version. Formal approval for the study was taken from institutional review board of AFIC & NIHD, Rawalpindi.

RESULTS

There were 73 patients included in the study. There were 44 (60.3%) female and 29

(39.7%) male in the study. Mean Age of the patients was 35.75 ± 9.4 years. Paired samples t-test was used to assess the effectiveness of PTMC before and after this procedure. The result were found to be statistical significant with respect to NYHA class of dyspnea, pulmonary hypertension and mitral valve area.

Mean NHYA Class of dyspnea of the patients before PTMC was 2.51 ± 0.71 and after PTMC mean NYHA Class of dyspnea was found to be 1.34 ± 0.51 (table-1).The results were statistically significance with *p* value less than 0.001 and statistically significant 95% Confidence Interval (95% CI; 2.25-2.74).

Similarly mean pulmonary hypertension of the patients before PTMC were found to be52.45 ± 15.63 mmHg and after PTMC mean pulmonary hypertension were found to be 44.58 ± 15.29 mmHg (table-2). The results were statistically significance with *p* value less than 0.001 and statistically significant 95% Confidence Interval (95% CI; 6.76-8.98).

Mean mitral valve area of the patients before PTMC were found to be0.81 ± 0.19 cm2 and after PTMC, mean mitral valve area were found to be 1.52 ± 0.16 cm2 (table-3). The results were statistically significance with *p* value less than 0.001 and statistically significant 95% Confidence Interval (95%CI; 0.76-0.65).

DISCUSSION

Mitral stenosis is mostly rheumatic in origin in the developing countries[1,20]. It is more common in young female having average to low socioeconomic background[6]. PTMC is a safe procedure through PFO or inter-atrial septal puncture, for opening of mitral valve and achieving better and significant fall in right ventricular systolic pressure and pulmonary arterial hypertension, increasing mitral valve area and improving NYHA class to acceptable levels with minimal associated complications. The good immediate and mid-term results obtained by percutaneous mitral commissurotomy in these patients in preliminary series suggest that the procedure may well postpone re-operation in selected patients providing the anatomy is suitable[16].

Wilkins score is used with view to predict the result of PTMC by assessing mitral valve with echocardiography[17]. PTMC is a safe and effective procedure in patients with mitral stenosis yielding satisfactory immediate results[18]. A study by Hasan-Ali et al showed that PTMC produced significant morphologic and hemodynamic changes in the mitral valve and our study results are in accordance with those findings[19]. In a study by Fawzy et al, the pulmonary hypertension fell from 48.6 ± 17.4 mmHg before PTMC to 31 ± 10 mmHg and showed statistically significance results[20]. Our study results also showed statistically significance in accordance with Fawzy et al. Another study by Hannoush et al. reported 31% decrease in pulmonary hypertension immediately after PTMC which were also statistically significant[21]. Both short and long term success, PTMC has demonstrated results to be comparable to closed commissurotomy. However, successful outcome lies in appropriate patient selection, experience of the center and the physician performing the procedure. Other factors affecting immediate success of the procedure include age, pre-procedure mitral valve area and Wilkins scores.

CONCLUSION

It is shown from this study that PTMC is successful in patients with mitral stenosis. It results in decreasing pulmonary arterial hypertension, increasing mitral valve area and improving NYHA dyspnea class. So, it is recommended in patients with mitral stenosis especially those who are non-responder to medical treatment or unsuitable for surgery should be treated with PTMC.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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