

Predictors of Success of Redo PTMC

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ABSTRACT

Background: The goal of this study is to investigate the factors that influence the effectiveness of redo percutaneous Transvenous Mitral Commissurotomy (PTMC) and to See how it affects MVA and echocardiographic parameters.

Methods: It was a single-center, retrospective research that took place at Cardiac Center QAMC Bahawalpur from 3rd January to 31st December 2020. All patients who had Redo PTMC had their medical records reviewed. The pre- and post-procedure values for mitral valve area (MVA), left atrial pressure (LA pressure), pulmonary artery systolic pressure (PASP), and mitral regurgitation (MR) were compared.

Results: Total 78 patients were enrolled, 28(36%) males and 50(64%) females with a mean age 37.15 ± 2.63 enrolled age range between 25-45 years. Patients were divided into two groups, the average age of in successful (Group I) patients was 31.08 ± 5.83 years and in un-successful (Group II) patients was 30.73 ± 4.21 . In Group-I, 18(64.3%) males and 30(60.0%) females as compare with Group-2, 10(35.7%) males and 20(40%) female's patients were enrolled. Both groups were well matched in other demographic and echocardiographic characteristics.

Findings of echocardiographic parameter showed that there is difference in Mitral Valve Area in (successful vs unsuccessful group) 1.69 ± 0.11 vs 0.67 ± 0.23 with p-value 0.024. The mean PA pressure 13.25 ± 5.19 vs 23.25 ± 6.55 and Mean LA Pressure 13.25 ± 5.19 vs 23.25 ± 6.55 with p-value 0.29 between pre and post-Redo PTMC was statistically significant as p-value = 0.001.

Conclusion: In patients with mitral stenosis, PTMC is a viable, safe surgery with a high success rate and tolerable morbidity. Repeat PTMC should be the procedure of choice in individuals with poor echo scores and no concomitant illnesses. Redo PTMC can be utilized as a palliative approach in patients with more severe valvular and subvalvular deformity who are at high risk of morbidity and death with MVR due to the presence of substantial concomitant conditions.

Keywords: PTMC Percutaneous transvenous mitral commissurotomy, MR Mitral Stenosis Rheumatic heart disease, Valve area, Mitral stenosis PASP pulmonary artery systolic pressure

INTRODUCTION

Rheumatic fever is becoming less prevalent in the Western world, but it is still an issue in poor nations like Pakistan, where the prevalence rate is 22 per 1,000 people. Based on particular research, the incidence of rheumatic fever and rheumatic heart disease (RHD) in different parts of Pakistan is as high as 206/100,000 and 18.6/1000, respectively. Young people suffer from cardiovascular morbidity and mortality, which results in around 250,000 deaths per year throughout the world. ⁽¹⁾ Patients with acute rheumatic fever are asymptomatic at first, then develop significant mitral stenosis (MS) and become symptomatic. The percutaneous technique is used to treat MS patients with favorable anatomy. Mitral valve surgery is used to treat patients with inappropriate anatomy and moderate to severe mitral regurgitation (MR). ⁽²⁾ For severe MS with flexible leaflets, percutaneous transvenous mitral commissurotomy (PTMC) has become the technique of choice. The effect of the stenosis on the left atrial pressure and size is the primary cause of MS symptoms. Exertional dyspnea is caused by an increase in left atrial pressure, which induces an increase in pulmonary venous pressure. ⁽³⁾ Although the PTMC technique improves the mitral valve area (MVA), it is not always successful in achieving an ideal MVA in certain patients, highlighting the necessity for clinical evaluation before deciding on a patient for the surgery. ⁽⁴⁾ Other PTMC problems, including as cardiac perforation, embolic stroke, and mitral regurgitation, also restrict the surgery. Mitral regurgitation and stenosis may necessitate an emergency mitral valve replacement or a PTMC redo. ⁽⁵⁾ MS causes a cascade of vasculopathic alterations in the pulmonary vasculature, leading in pulmonary hypertension, due to the high pressures in the pulmonary vasculature. The ability to live a long, event-free life is heavily influenced by pulmonary artery hypertension (PAH). Percutaneous trans-mitral commissurotomy (PTMC) has become a first-line interventional therapy for multiple sclerosis (MS). ⁽⁶⁾ A drop in pulmonary arterial pressure (PAP) is noticed immediately after

redo PTMC, with a longer-term progressive decline. Because the long-term effectiveness of PTMC is inextricably linked to a drop in PAP, patients with an insufficient initial decrease in PAP after PTMC have a poor long-term prognosis. ⁽⁷⁾ Noor A, et al. discovered that age, RV size, and left atrial (LA) pressure were all independently linked to a decrease in pulmonary artery systolic pressure (PASP) after redo PTMC. The elements that influence the reduction of PAH have not been thoroughly investigated. Because the effectiveness of PTMC is highly dependent on the reduction in PAP following PTMC. ⁽⁸⁾ The goal of this study was to find a predictor of redo PTMC success so that patients could be triaged prior to undergoing such an invasive treatment and success could be anticipated.

MATERIAL AND METHOD

The research was carried out at the Cardiac Center QAMC Bahawalpur, Pakistan. From 3rd January to 31st December 2020, retrospective data was collected from hospital records for patients who received redo PTMC.

Symptomatic moderate to severe Mitral stenosis undergoing Redo PTMC patients were included in this research. Patients with persisting left atrial or left atrial appendage thrombus, and more than mild mitral regurgitation. Severe concurrent aortic valve disease, severe organic tricuspid stenosis, and severe concomitant coronary artery disease needing bypass surgery (or) history of cardiac surgery were all ruled out.

RESULTS

The baseline and clinical characteristics of both groups (successful and unsuccessful) are summarized in Table-1. Total 78 patients divided into two groups. The average age of in successful (Group 1) patients was 31.08 ± 5.83 years and in un-successful (Group 2) patients was 30.73 ± 4.21 . In Group-1, 18(64.3%) males and 30(60.0%) females as compare with Group-2, 10(35.7%) males and 20(40%) female's patients were enrolled. Both groups were

well matched in other demographic and echocardiographic characteristics (Table 1).

Findings of echocardiographic parameter showed that there is difference in Mitral Valve Area in (successful vs unsuccessful group) 1.69 ± 0.11 vs 0.67 ± 0.23 with p-value 0.024. The mean PA pressure 13.25 ± 5.19 vs 23.25 ± 6.55 and Mean LA Pressure 13.25 ± 5.19 vs 23.25 ± 6.55 with p-value 0.29 between pre and post-Redo PTMC was statistically significant as p-value = 0.001. (Table 2)

Table 1: Baseline Characteristics of the Patients.

	Variables	Successful Cases (Group 1) (n=48)	Unsuccessful Cases (Group 2) (n=30)	p-value
	Age (years)	31.08 (05.83)	30.73 (4.21)	0.28
	Male	18 (64.3%)	10 (35.7%)	0.53
	Female	30 (60.0%)	20 (40.0%)	
	Height (cm)	154.4 \pm 7.5	153.2 \pm 8.5	0.04
	Weight (kg)	52 \pm 11.6	51.9 \pm 10	0.03
Pre MR	No	32 (66.7%)	16 (33.3%)	0.319
	Mild	12 (60.0%)	8 (40.0%)	
	Moderate	4 (66.7%)	2 (33.3%)	
	Moderately Severe	0 (0.0%)	4 (100.0%)	
Post MR	No	36 (90.0%)	4 (10.0%)	< 0.01
	Mild	12 (60.0%)	8 (40.0%)	
	Moderate	0 (0.0%)	4 (100.0%)	
	Severe	0 (0.0%)	14 (100.0%)	

Table 2: Echocardiographic features of patients who underwent PTMC

Echocardiographic Parameter	Successful Cases (n=48)	Unsuccessful Cases (n=30)	p-value
MVA, cm2 (±SD)	1.69±0.11	0.67±0.23	0.024
PA Pressure mmHg (±SD)	40.11±9.04	65.95±19.84	0.037
Mean LA Pressure mm (±SD)	13.25±5.19	23.25±6.55	0.011
Tricuspid Regurgitation			
Yes	19	8	0.041
No	7	5	
LV dysfunction			
No/ Mild	22	11	0.016
Moderate/ Severe	2	4	

DISCUSSION

Since its introduction in 1984, percutaneous mitral valvuloplasty has advanced tremendously. Because of its low short- and long-term morbidity and mortality, PTMC is recommended for symptomatic severe mitral stenosis.⁽⁸⁾ The procedural and symptomatic results of PTMC are good, equivalent to open surgical commissurotomy, but substantially better than close mitral valve commissurotomy treatments.⁽⁹⁾ The results of the current trial, which included 28 (72%) patients who were effectively treated with Redo-PTMC. According to Jung et al. (2012) effective PTMC that lasted 20 years without intervention had a survival rate of 38%.⁽¹⁰⁾ On short and long-term follow-up, there was a considerable clinical and hemodynamic improvement with PTMC.

The data acquired from our patients indicated that PTMC is a highly effective treatment in an era when rheumatic heart disease is on the decline in most developed countries. PTMC was discovered in a mostly younger population. The patients' young age might explain the low frequency of problems and quick favorable results.

Our patients' age and gender distributions were similar to that of patients in poor nations. The current study is a single-center, retrospective, open-label study with 78 patients, with a mean age of 37.15 ± 2.63 , participated in this research. Sharma et al., (2014) reported that the average age of their patients was 33.57 ± 9.125 years, while lung et al., (2015) discovered that the average age of their patients was 39 ± 1.1 years. However, Pathan et al., (2013) observed that the average age of their participant was 58 ± 1.3

years. The majority of patients with prior PTMC were female 50 (64%), which was similar to Pathan et al's findings, which showed that the majority of patients were females 75 %. Patients with prior PTMC had a higher rate of atrial fibrillation in our research, which was 26% compared to 50% in both lung et al and Pathan et al, and a different proportion of the AF population, which was 25% compared to 11% in lung et al and 61% in Pathan et al.⁽¹⁰⁻¹¹⁾

The LA pressure in the current investigation indicated a statistically significant difference, with a p-value of 0.001 and a drop from 32.79 ± 7.05 mmHg to 18.90 ± 4.59 mmHg. The current study found that the MVA was greatly enhanced, and that 80 to 95 % of patients may have a successful surgery, defined as MVA > 1.5 cm² in the absence of problems such as cardiac tamponade or emergency surgical treatment, as well as death in hospital. The mean systolic pressure of the right ventricle reduced from 67.07 ± 18.66 to 41.23 ± 11.16 mmHg.

In another study conducted by Shrestha et al (2015), the success rate at all patients of all ages in our center was 84 %. In this study, successful PTMC was defined as a drop in mean LA pressure of more than 50% from baseline, a rise in MVA of more than 50% from baseline, and a final absolute MVA of more than 1.5 cm² in the absence of more than mild edema. MR.⁽¹²⁾

Sriram et al. (2015) published their findings. They discovered that in pre and post redo PTMC patients, the mitral valve area, mean transmitral gradient, and pulmonary artery pressures were statistically significant difference (p-value 0.05).⁽¹³⁾

The previously distorted valve causes rheumatic process or abnormal turbulences. Both methods may have a role in additional commissural fusion, thickening, and calcification of valve and sub-valvular structures, both in the natural world and in the past. Only one incidence of severe post-mitral regurgitation was found in the acute period, according to the findings. Mitral regurgitation was the most serious flaw. There were not many patients in the chronic phase among the individuals we operated on. There was no physical difference in pathology results between the two groups, according to the data.

Our findings imply that, rather than focusing solely on mitral valve apparatus-related predictions, other demographic, echo, and technique-related factors of a successful PTMC should be investigated. It also emphasizes the necessity for a modified Wilkins score that incorporates other factors such as BSA, pulmonary artery pressure, and left ventricular dysfunction.

CONCLUSION

Aside from Wilkins score, greater body surface area, larger pre-procedure mitral valve annulus size and area, and improved left and right ventricular hemodynamics are also linked to effective PTMC. Our findings support the use of percutaneous intervention, as well as an appropriate mitral valve device, prior to the deterioration of annulus size and pulmonary artery pressure. It also proposes the creation of a modified Wilkins score that includes other predictors of effective PTMC.

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