

OUTCOMES OF PERCUTANEOUS TRANSLUMINAL MITRAL COMMISSUROTOMY (PTMC) FOR SEVERE MITRAL STENOSIS IN PREGNANCY

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ABSTRACT

Objective: To know short term outcomes of PTMC for severe isolated mitral stenosis in pregnancy

Methodology: This observational study was performed in Cardiology Unit of Lady Reading Hospital Peshawar from January 2003 to December 2014. All patients with symptomatic severe isolated mitral stenosis with no more than moderate degree mitral regurgitation were included in the study. They were followed till delivery.

Results: A total number of 36 pregnant patients undergoing PTMC for isolated severe mitral stenosis were included in the study. Mean age was 29 ± 6.3 years. Mild mitral regurgitation was found in 18(50%) of patients, moderate mitral regurgitation in 3(8.3%) while there was no mitral regurgitation in 15(41.7%) patients. Mean mitral valve area was 0.8 ± 0.36 cm². Mean mitral valve gradient was 23 ± 11 mm of Hg. There mean left atrium size was 4.7 ± 1.2 cm. Mean ejection fraction was 58.43%. Mean pulmonary artery pressure was 45.8 ± 16.4 mm of Hg. PTMC was performed in second trimester in 32(88.88%) patients and in third trimester in 4(11.11%) patients. PTMC was successful in 33(91.6%). Post PTMC mitral valve area was 1.8 ± 0.82 cm². The mean mitral valve gradient was 4 ± 3.2 mm of Hg. Mean left atrium size was 4.61 ± 2.34 cm. Mild mitral regurgitation was found in 17(47.22%). Moderate mitral regurgitation was found in 5(13.8%) of patients. Acute severe mitral regurgitation occurred in 1(2.7%) patient, for which emergency mitral valve replacement was arranged but expired. One (2.7%) had still birth. The mean fluoroscopy time was 9.3 ± 7.2 minutes.

Conclusion: PTMC is safe and effective procedure for severe symptomatic mitral stenosis in pregnant patients.

Key Words: Percutaneous Transluminal Mitral Commissurotomy (PTMC), Mitral Stenosis, Pregnancy

INTRODUCTION

The frequency of valvular heart disease in all pregnancies is about 0.5 to 1.5%.¹ Mitral stenosis is the most common form of all valvular heart disease with increased pregnancy and delivery complications for both mother and neonate.² The main causes of mitral stenosis decompensation are the hemodynamic changes of the maternal circulation.³ The symptoms are poorly tolerated especially beyond second trimester and in other cases may lead to frank heart failure.^{4,5} Most pregnant women with mitral stenosis can be adequately treated with medical therapy and sometimes an invasive procedure is mandatory.⁶⁻⁹ In the last two decades; percutaneous transluminal mitral commissurotomy (PTMC) has become the treatment of choice for patients with symptomatic rheumatic mitral stenosis (MS). Since its introduction in 1984 by Inoue et al, PTMC by Inoue technique has been widely used in the treatment of mitral stenosis.¹⁰ Several studies have reported good immediate, short-term and long-term results.^{11,12} Before the introduction of percutaneous transluminal mitral commissurotomy (PTMC) surgical commissurotomy was the sole answer to pregnant women with refractory symptoms. The high mortality rate (1.8% to 33%) of surgery and favorable outcome of PTMC in relieving symptoms plus lower risk of fetal death made PTMC very popular and attractive treatment option.¹³⁻¹⁸ Prospective studies on PTMC and its effect on pregnancy outcome and neonate are needed. The aim of this study is to investigate the clinical outcome of pregnant women undergoing PTMC and to assess the neonate condition after one month.

METHODOLOGY

This observational study was performed in Cardiology Unit of Lady Reading Hospital Peshawar from January 2003 to December 2014. All patients with severe isolated mitral stenosis with pregnancy were included in the study. All patients were subjected to transesophageal echocardiography to look for left atrium/ left atrial appendage clot, more than moderate degree mitral regurgitation. The patients not suitable for PTMC were excluded from the study i.e. more than moderate mitral regurgitation, Left atrium/Left atrial appendage clot, calcified valves. Transthoracic echocardiography and transesophageal echocardiography was performed by trained cardiologist. Severe mitral stenosis was defined by echocardiographic criteria as associated with mean transvalvular gradient of more than 10 mm of Hg, pulmonary artery pressures of 2 more than 50 mm of Hg and a valve area of less than 1 cm. Transthoracic echocardiography was performed by a standard technique using Toshiba Xario 2100 and Philips DH 11 echocardiographic machines pre and 24 hour post PTMC. M-mode measurements were recorded according to 20 American Society of Echocardiography criteria. The mitral valve area was

measured by continuous wave Doppler using the pressure half time method. The mean transmitral diastolic pressure was estimated from the maximal transmitral flow velocity using a modified Bernoulli equation. LA diameter was taken in the parasternal long axis view in M mode at end systole. Measurements were taken in three beats in patients with normal sinus rhythm and in ten beats in atrial fibrillation and the mean values were taken for analysis. All the patients with Diabetes, hypertension, suboptimal PTMC, mitral regurgitation more than grade 1, ECG evidence of Coronary artery disease or any echocardiographic evidence of ischemia / segmental wall motion abnormalities were excluded from the study. Patients with suspected peripartum cardiomyopathy were also excluded from the study.

RESULTS

A total number of 36 pregnant patients undergoing PTMC for isolated severe mitral stenosis were included in the study. Mean age was 29±6.3 years of them 14(38.8%) were having atrial fibrillation. Mild mitral regurgitation was found in 18(50%) of patients, moderate mitral regurgitation was found in 3(8.3%) while there was no mitral regurgitation in 15(41.7%) patients. Mean mitral valve area was 0.8±0.36 cm². Mean mitral valve gradient was 23±11 mm of Hg. There Mean Left atrium size was 4.7±1.2cm. Mean

Table 1: Baseline Characteristics of Pregnant Patients Undergoing PTMC

Characteristics		Numbers (Percentages)
Pre PTMC mitral valve area		0.8±0.36 cm ²
Mitral regurgitation	Mild	18 (50)
	Moderate	3 (8.3)
	Severe	0
Pre PTMC RVSP		45.8±16.4 mm of Hg
LV ejection fraction		58.43±8.32%
LA diameter		4.72± 1.24 cm
Pre PTMC mitral valve gradient		23±11mm of Hg
Time of PTMC during Pregnancy	2nd Trimester	32 (88.88)
	3rd trimester	4 (11.11)
Successful PTMC		33 (91.6)

Table 2: Outcomes of Pregnant Patients with PTMC

Post PTMC mitral valve area	1.8±0.82cm ²		
Post PTMC RVSP	39.21±15.43 mm of Hg		
LV ejection fraction	59.6%.±8.32%		
LA diameter	4.61± 2.34 cm		
Post PTMC Mitral valve gradient	4±3.2 mm of Hg		
Post PTMC mitral valve Regurgitation	Mild	17 (47.22)	47.22%
	Moderate	5 (13.8)	13.8%
	Severe	01 (2.7)	2.7%

Ejection fraction was 58.43%. Mean pulmonary artery pressure was 45.8±16.4 mm of Hg. PTMC was performed in second trimester in 32(88.88%) Patients and in third trimester in 4(11.11%) patients. PTMC was successful in 33(91.6%). Post PTMC mitral valve area was 1.8±0.82cm². Mean mitral valve gradient was 4±3.2 mm of Hg. Atrial fibrillation was found in 13(36.11%). Mean left atrium size was 4.61± 2.34 cm. Mild mitral regurgitation was found in 17(47.22%). Moderate mitral regurgitation was found in 5(13.8%) of patients. Acute severe mitral regurgitation occurred in 1(2.7%) patient, for which emergency mitral valve replacement was arranged but expired. Mean RVSP was 39.21±15.43 mm of Hg. one (2.7%) still birth occur. The mean fluoroscopy time was 9.3±7.2 minutes. Mean Ejection fraction was 59.6%±8.32%. These are shown in Table 2.

DISCUSSION

We have found in our experience of 36 pregnant patients with severe mitral stenosis that PTMC is safe procedure for treatment of these symptomatic patients. Stenotic cardiac lesions do worst during pregnancy. Pregnancy is characterized by a hyper dynamic state with significant change of hemodynamic especially between the 24th and 26th week of gestation and at time of delivery which can

explain decompensation in pregnant women with critical mitral stenosis.^{19,20} In critical mitral stenosis, the increased amount of blood is unable to pass from left atrium to left ventricle specially when heart rate is increased which make the patient symptomatic due to pulmonary venous hypertension. However, most patients respond well to adequate medical therapy. The main stay of medical treatment is beta blockers which decrease the heart rate and allow the left atrium to empty to ventricles through stenosed mitral valve. In some cases, maximal medical therapy is not enough and an invasive intervention is needed. Previously Surgical mitral commissurotomy was performed during pregnancy for symptomatic mitral stenosis, which was associated with increased mortality and morbidity for both mother and neonates.²¹⁻²³ Percutaneous mitral valvuloplasty was performed for the first time in 1984. PTMC proved a safe procedure with outstanding results. However, studies with proper follow-up have not yet been fully described. The present study shows an excellent outcome for the patients after PTMC. After the successful procedure, all of the patients were symptomatically and clinically improved and only one of them required an additional surgical procedure mitral valve repair/replacement, who did not survive the event. The rest of them do better till end of pregnancy and 6 weeks postpartum. In addition, there were no maternal death related to the procedure. There was only one still birth which was also not directly due to procedure. Echocardiographic examinations also showed favorable results, with a significant increase in mitral valve area and decrease in transmitral gradient shortly after the procedure. Only one case of severe mitral regurgitation was observed. The excellent results observed after PTMC in this study can be attributed to the young age of the group and suitable mitral valve morphology. In our study all the patients were subjected to trans esophageal echocardiography and only patients with suitable mitral valve morphology was subjected to PTMC as per the AHA/ACC recommendation. These parameters are both important predictors of short and long term results.^{22,24}

In a study by Abdi et al. whom studied the immediate results of PTMC in 33 pregnant patients with severe symptomatic mitral stenosis found that PTMC is a very safe procedure for these pregnant patient.²⁵ In their series no death was reported but having one severe mitral regurgitation that was tolerated well.²⁵ So There study support our findings in term of excellent results of PTMC in severe mitral stenosis pregnant patients.²⁵ Also the mean flouro time was much less than the recommended radiation dose for fetus in our study. In our study there were no maternal or fetal deaths directly related to the procedure. No fetal abnormalities were found during examination and no clinical abnormalities could be associated with the use of radiation. Concerning the radiation exposure, the maximum safe radiation dose for the mother and the child has been established as 5 rads. Similar fluoroscopy time and the same protection used in

other series, reported the total amount of received radiation to be approximately 0.5 rads, therefore far below the established limit. In our study we did not calculate the actual dose received by mother and fetus but measure the total fluoroscopy time, which was 9.3 ± 7.2 minutes which is the shortest time possible for performing PTMC, the main reason for reduced procedure and fluoroscopy time in our high volume center.

Resorting to the multispecialty approach in the management of women with cardiac disease during pregnancy and labor resulted in reduce maternal and fetal mortality. And regarding the operator for PTMC in pregnant patients, all the PTMC were performed by the experienced operator who have performed at least one hundred PTMC in order to reduce the fluoroscopy time and avoid extra exposure of fetus and mother to radiation. Early diagnosis, counseling, vigilant follow-up both antenatal and post-natally, effective surgical and medical interventions whenever required, availability of and access to the super speciality care can make maternal and fetal mortality rare in women with cardiac disease.²⁶⁻²⁹ There is need for early detection, effective counseling, and vigilant follow up, with careful fetal surveillance and follow up of these women in the post-natal period. Ideally, major cardiac interventions in the form of balloon mitral valvotomy, closed mitral valvotomy, mitral valve replacement should be performed before pregnancy to prevent maternal complications. However, the availability and access to immediate medical, surgical obstetric and nursing care i.e., a multi-specialty approach remains the cornerstone for an optimal maternal and fetal outcome in these women.

In summary, due to the favorable results observed, percutaneous mitral valvuloplasty can be considered the procedure of choice to treat pregnant women with mitral stenosis unresponsive to adequate medical therapy.

CONCLUSION

PTMC is safe and easy procedure for pregnant patients with mitral stenosis.

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