



PERCUTANEOUS TRANSVENOUS MITRAL COMMISSURECTOMY IN PREGNANCY PATIENTS AND ITS OUTCOME

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ABSTRACT **Background:** Rheumatic mitral stenosis constitutes a major cause of acquired heart disease complicating pregnancy in India.[†]

Symptomatic worsening occurs during pregnancy because of increased hemodynamic burden associated with pregnancy, which includes increased blood volume, heart rate, mean left atrial pressure, and pulmonary venous pressure which can precipitate pulmonary edema.²⁻⁵ Medical treatment alone may not be sufficient in these patients and relief of mitral obstruction is often required. Treating these patients with surgical valvotomy has shown to have adverse fetal outcomes. Balloon mitral valvotomy (BMV)/ Percutaneous Transvenous Mitral commissurectomy (PTMC) procedure is an alternative option in this situation. In the present study, we have examined the fetal and maternal outcomes of women undergoing PTMC during pregnancy.

Methods and Results: It is a prospective, Observational followup study. We studied admitted Pregnant patients with Rheumatic severe valvular mitral stenosis underwent Percutaneous Transvenous Mitral commissurectomy procedure in our hospital from August 2016 to February 2019. 15 pregnant women were included in this study in whom balloon mitral valvotomy was performed. The mean age of these patients was 26.7 ± 3.1 years. The mean gestational age was 26.5 ± 5.2 weeks (12-36 weeks). The procedure was successful in 15 patients (100%). Mean two-dimensional MVA increased from baseline value of 0.77 ± 0.17 cm² to 1.77 ± 0.27 cm² (p value <0.04). Pre-procedure peak pulmonary artery pressure was 36.05 ± 16.88 mmHg, which decreased to 10.31 ± 2.36 mmHg (pvalue <0.0001). Hemodynamic data showed pre-BMV left atrial mean pressure of 25.2 ± 6.6 mmHg, which decreased to 10.3 ± 4.8 mmHg after the procedure (p value <0.04). The Mean left atrial pressure decreased on average by 42%, and the maximum pressure (V wave) decreased on average by 40%. Mean fluoroscopy time was 9.0 ± 1.2 min. There was no maternal mortality in our study. No cardiac tamponade, cardiac perforation, severe mitral regurgitation noted in this study. Post-procedure follow-up showed an improvement in NYHA status by at least one class in 100% of patients. Nine (71.4%) patients had a term normal vaginal delivery and 4 (28.5%) underwent cesarean section for obstetric indications at 38 weeks of gestation. One of the patients had IUD with spontaneous expulsion one month after procedure. All patients were discharged 24 to 48 h after valvuloplasty, continuing their pregnancies without complications. All without complications with healthy newborns that developed normally. In follow-up, no patient who had moderate/Severe mitral regurgitation after valvuloplasty and not requiring surgical correction after the PTMC Procedure.

Conclusion: In pregnant patients who have severe mitral stenosis and persistent congestive heart failure symptoms despite conventional medical treatment, when feasible, percutaneous balloon mitral valvuloplasty is the best treatment. Percutaneous mitral valvotomy during pregnancy is safe and provides excellent symptomatic relief and hemodynamic improvement. This should be considered as the treatment of choice when managing pregnant women with severe mitral stenosis.

KEYWORDS : Rheumatic Severe Mitral Stenosis, Percutaneous Transvenous Mitral Commissurectomy, Gestational Diabetes Mellitus.

INTRODUCTION:

Pregnancy is associated with hemodynamic stress on the cardiovascular system, and this can be associated with increased risks for both mother and baby, particularly in women with preexisting

cardiovascular disease.

Mitral stenosis is the most common valvular heart lesion found in pregnancy. When severe, it leads to significant maternal and fetal

morbidity and mortality, since the hemodynamic adaptations to pregnancy are badly tolerated. Pregnancy can lead to development of heart failure in patients with asymptomatic or even unknown mitral stenosis, as a result of the increased mitral valve pressure gradient caused by the physiologic increase in heart rate and blood volume in pregnancy. When symptoms persist despite optimal medical therapy, the poor prognosis justifies the correction of mitral stenosis during pregnancy.

METHODS:

2.1 Study population:

Between August 2016 and February 2019, 350 patients with RHD were admitted to our hospital. Out of them 85 had RHD/Severe MS. Out of them 15 patients of Antenatal Mother with RHD/Severe MS Underwent PTMC Procedure in our Hospital.

The criteria for diagnosing RHD/Severe MS were

- 1) Past history of RF/RHD
- 2) ECG Evidence of NSR, PMitral, AF, LAE.
- 3) ECHO Evidence of Severe Valvular MS by Planimetry and Pressure half time method, Wilkins score less than 8/16, Mitral valve Gradient by CW Method.
- 4) Cath lab Evidence to measure of Mean LA Pressure pre/post Procedure.

3. Treatment protocol:

Patients who presented RHD/MS, Secondary Prophylaxis Inj. Benzathine penicillin, Oral Penicillin V 250 mg bd., T. Metoprolol 25 mg od, Anti failure Drugs sos. T. Digoxin 0.25 mg 1od(5/7), syp. Potassium Chloride. T. Verapamil 40mg 1tds.

3.1 Percutaneous trans venous Mitral commissurotomy intervention:

We performed percutaneous balloon mitral valvuloplasty using the Accura Balloon technique according to Height of the patients using Hung's formula in the Fifteen pregnant patients, with success, from 22 weeks of gestation up to 35 weeks of gestation.

4.1 Incidence of RHD/MS:

Of the 350 patients 85 had RHD/Severe MS (24.28%). Out of the 85 patients with RHD/Severe MS, 15 had Antenatal Patients with RHD/SEVERE MS (17.64%).

4.2 Age of the AN Mother:

Out of the 15 patients with RHD/MS, 60% were aged between 20-24 years of age, 20% were aged between 25-30 years of age, 20% were age between 31-35 years.

4.3 Duration of RHD:

The duration was highly variable ranging from 30 days to 4 years.

4.4 Time of contact to medical help:

The duration was highly variable ranging from 1 day to 30 days.

4.5 Comorbidities:

13.33% were Anaemic, 6.66% patients were diabetic, 13.33% were hypertensives, 6.66% Hypothyroidism and 6.66% Residual Polio.

4.6 Addiction:

Nil.

4.7 Length of stay: 30 days to 60 days.

Average duration of hospital stay was 30 days.

4.8 Wilkins score:

Average score at the time of presentation was 5/16.

4.9 Cardio embolic Stroke:

Nil.

4.10 Non-cardiac Early complications: Access site Mild Haematoma

2 patients (13.33%).

1 patient developed DVT (6.6%).

4.11 Major Complications: IUD 1 patient (6.6%).

4.12 Maternal Mortality: Nil.

4.13 Post PTMC Period:

Patient treated with IV Antibiotics, DVT prophylaxis, T. Penicillin

250mg bd, T. Metoprolol 25 mg 1od.

4.14 Follow up:

All patients followed up with every month. Follow up Echocardiogram done. Advice for Regular oral Medications.

5. STATISTICAL ANALYSIS:

The data obtained were input into the SPSS statistical software, version 20.0. A descriptive statistical analysis was performed. P value was set significant at <0.05.

CATH MEAN LAP –POST PTMC	No. of cases	percentage
06-10mmhg	8	53.3%
11-15mmhg	4	26.6%
16-20mmhg	3	20%
Total	15	100%

BMI KG/M2	No. of cases	percentage
<20	1	6.6%
21-25	13	86.6%
26-30	1	6.6%
TOTAL	15	100%

BIRTH WEIGHT IN KG	No. of cases	percentage
<2.5 KG	1	7.0%
2.5KG	4	28.57%
2.6KG	3	21.4%
2.7KG	4	28.57%
2.8KG	2	14.28%
TOTAL	14	100%

POST PTMC COMPLICATIONS	No. of cases	percentage
HAEMOTOMA	2	13.33%
DVT	1	6.6%
IUD	1	6.6%
NO COMPLICATION	11	73.33%
Total	15	100%

ECG RHYTHM	No. of cases	percentage
AF	2	13.33%
NSR	13	86.66%
Total	15	100%

WEIGHT IN KG	No. of cases	percentage
40-45 KG	2	13.3%
46-50KG	4	26.6%
50-60 KG	9	60%
TOTAL	15	100%

PRE PTMC MITRAL VALVE AREA	No. of cases	percentage
0.6	0	0%
0.7	1	6.6%
0.8	6	40%
0.9	4	26.66%
1.0	2	13.33%
1.1	2	13.33%
Total	15	100%

MODE OF DELIVERY	No. of cases	percentage
NFTVD	10	66.6%
LSCS	4	26.6%
IUD/SPONEXP	1	6.6%
Total	15	100%

POST PTMC MITRAL VALVE AREA	No. of cases	percentage
1.4	0	0%
1.5	4	26.66%
1.6	2	13.33%
1.7	2	13.33%
1.8	5	33.33%
1.9	1	6.6%
2.0	1	6.6%
Total	15	100%

DURATION OF ILLNESS	No. of cases	percentage
1 month	2	13.33%
1-6month	3	20%

6-12month	6	40%
1-2 years	2	13.33%
2-5 years	2	13.33%
Total	15	100%

DISCUSSION:

In our study 350 RHD Patients attended in our hospital during this study period. Among these 85(24.28%) patients Successfully underwent PTMC Procedure in our hospital. Among these 15(17.64%) patients of Antenatal Mother underwent PTMC Procedure in our Hospital.

(60%) of the patient were age between 20-24 years of age.(3) 20% were aged between 25-30 years,(3)20%were aged between 31-35years of age.

Height of AN patients between140-145cms were(73.3%),Between 145-150 cms were (13.3%),between 150-160 cms were (13.3%).

Associated comorbidities Anaemia 2(13.3%) patients had Anaemia, GDM 1patient(6.6%),GHT 1patient (6.6%),Hypothyroidism 1patient (6.6%),Residual Polio 1patient (6.6%).

Patient developed Dyspnoea NYHA Class II 5patients(33.33%), NYHA Class III 7patients(46.66%),ClassIV 3 patients(20%). 2 patientshad Orthopnoea (13.3%),Paroxysmal Nocturnal Dyspnoea 2 patients had Paroxysmal Nocturnal Dyspnoea (13.3%).

ECG changes Atrial Fibrillation in 2 patients (13.3%), 13 (86.6%) Patients in NormalSinus Rhythm.

Echocardiogram shows 5 (33.33%) patients had Wilkins score of 5/16, 6 (37.5%) Patients had 6/16, 3(20%) patients had 7/16, 1(6.6%) patient had 8/16. 12 patients (80%) had Mild Pulmonary Hypertension,2patients (13.3%) had Moderate Pulmonary hypertension.

Pre PTMC procedure Left Mean Atrial pressure measured in cath lab were 60%Patient had 20-25mmhg,20% pt had LAP 26-30mmhg,20%Pt had LAP31-36 mmhg. Post PTMC procedure 8 (53.3%)patients reduced mean LAP of 6-10mmhg,4(26.6%)patients reduced meanLAP of 11-15mmhg, 3(20%) patients attained mean LAP of 16-20mmhg.

Post procedure complicationslike Early complication of Echocardiogram shows 7 (46.6%) patientshad no MR, 6(40%)patientshadTrivialMR, 2(13.3%)patients had mildMR after PTMC Procedure.

2patients(13.3%)had mild Haemotoma, 1(6.6%) patient had Left lower limb DVT.

1 patient Packed cell transfusion given due to Anaemia. Late complication of IUD occurred one month after the PTMC Procedure 1(6.6%)patient due to maternal cause .

Patient underwent FTNVD of 10 (71.4%) patients,4(28.6%) patient underwent LSCS due to Obstetrics Reasons. No Maternal Mortality in our study,Neonatal outcome better in our study. Except one case IUD with Spontaneous expulsion due to maternal cause .

Birth weight 2.46 kg 1(6.6%) baby,4(26.66%) babies born with 2.5 kg,3 (20%)Newborn with wt of 2.6 kgs,4(26.6%)Newborn with 2.7 kgs.2(13.3%) new born with 2,8 kgs.

Average Fluroscopic time 9 minutes in our study.. Patient Symptomatically improved . The procedure was done with pelvic and abdominal shielding. To minimize radiation exposure very minimal angiography was done and the procedure was done with echo-Doppler guided stepwise mitral valve dilatation. The mitral valve area after balloon valvotomy increased from 0.7 to 2 cm². Mitral valve area assessed by Planimetry method increased average of two times. After Accura balloon valvotomy the mean Doppler mitral valve area increased from 0.7 +/- 0.1 to 2.0 +/- 0.3 cm² (p < 0.04) and by two-dimensional echocardiography from 0.7 +/- 0.2 to 1.7 +/- 0.3 cm² (p < 0.04), with no significant Doppler residual stenosis (defined as mitral valve area < or = 1.5 cm²). There was no mortality or significant morbidity. At 6-week follow-up the patient was virtually

asymptomatic. Vaginal delivery was uneventful. Balloon mitral valvotomy using the Accura Balloon technique in pregnancy with echo guided stepwise dilatation is accomplished with minimal radiation exposure, provided abdominal shielding is implemented throughout the procedure.

Pregnancy was uneventful in all patients, and all were delivered of normal babies without complications. The mitral valve stenosis is the most frequently occurring Valvular Heart Disease in pregnant patients. When it carries a significant risk of mortality for both mother and fetus, it can be performed a surgical commissurotomy, with a high risk for the fetus.

We report our experience in percutaneous mitral Balloon valvuloplasty (BMV) in 15 patients during the second and third trimester of pregnancy with severe mitral stenosis. In this cases, we performed PTMC in NYHA (New York Heart Association) CF II, III and IV patients refractory to medical treatment. We used the trans septal double balloon technique protecting the abdominal wall using a lead apron. The mitral areas increased from 0.7 to 2 cm², without a significant development of mitral regurgitation. In all cases, the infants delivered at term without complications and with normal weight. The PTMC arise like an ideal intervention for the treatment of mitral stenosis during pregnancy.

Conclusion:

In pregnant patients who have severe mitral stenosis and persistent congestive heart failure symptoms despite conventional medical treatment, when feasible, percutaneous balloon mitral valvuloplasty is the best treatment. Percutaneous mitral valvotomy during pregnancy is safe and provides excellent symptomatic relief and hemodynamic improvement. This should be considered as the treatment of choice when managing pregnant women with severe mitral stenosis. Maternal and foetal outcome for better with intervention .

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14. Singh et al.12 from Jayadeva Institute of Cardiovascular Research, Bengaluru, India studied outcome in 58 pregnant patients with mean gestational age of 26.53 ± 5.2 weeks. They reported a success rate of 91% and increase in mean 2D MVA from 0.87 ± 0.14 cm² to 1.82 ± 0.25 cm². No maternal mortality or abortion occurred during this study.
15. Hari Krishnan et al.13 (n = 36) reported a procedural success rate of 97.2% and an excellent symptomatic improvement. There was no maternal mortality in this study, though 3 preterm deliveries were reported. In the present series, 39 (79.3%) patients had term normal vaginal deliveries and 8 (16.7%) had caesarian sections. The mean fluoroscopic time in the study of Hari Krishnan et al. was 5.4 ± 5.8 min which were comparable to the present study.
16. Gupta et al.14 evaluated the safety and efficacy of BMV in 40 pregnant women with

- rheumatic mitral stenosis. Thirty-nine patients underwent a successful procedure. Eleven patients in whom BMV was performed before 20 weeks of gestation underwent medical termination of pregnancy. Out of the 29 women who continued pregnancy, one patient developed preterm labor and one had a stillbirth. There was no maternal mortality in this study. Mean fluoroscopy time was 7.8 ± 1.8 min.
17. Routray et al. have studied patients undergoing BMV during pregnancy and the long-term effects on child development in them.¹⁵ They performed BMV in 40 pregnant women and 39 of them had successful outcome. After a mean follow-up of 36 ± 15 months, 38 babies maintained normal growth and development except for a single death of a baby at 7th month due to pneumonia.
 18. Kinsara¹⁶ conducted a follow-up study in 20 pregnant women who had BMV during pregnancy. Their offspring had mean age of 63 ± 39 months (range 6–98). All had normal growth and development as assessed by standard development charts and laboratory tests. The above studies show that BMV done during pregnancy had no major adverse effects on the fetus and postnatal growth and development of the offspring.