PERCUTANEOUS BALLOON MITRAL VALVOPLASTY DURING PREGNANCY IN CASES OF MITRAL STENOSIS (A STUDY OF 20 CASES)

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SUMMARY

Mitral stenosis is one of the most common heart disease associated with pregnancy and a major non-obstetric cause of maternal death. A study of 20 patients who underwent percutaneous balloon mitral valvoplasty during pregnancy for severe mitral stenosis was done at L.T.M.G. Hospital, Sion, Bombay. The average increase in mitral valve area was 0.9 cm^2 and all patients had symptomatic relief within 24 hours. The safety of the procedure in relation to maternal and foetal outcome was studied and compared to that of closed mitral commissurotomy.

INTRODUCTION

Mitral stenosis is the most common acquired valvular heart disease associated with pregnancy. The increase in cardiac output, circulating blood volume and heart rate that occurs in pregnancy may convert a minimally symptomatic patient before conception into a markedly symptomatic one during the later half of pregnancy and labour. There is common aggrement that heart disease is a major non-obstetric cause of maternal mortality, with pulmonary oedema and congestive cardiac failure being the immediate cause of death. To prevent this, patients with disabling symptoms and signs of pulmonary congestion despite intensive medical therapy, have in the past required cardiac surgery in the form of

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either mitral valvotomy or mitral valve replacement. Recently, percutaneous balloon mitral valvoplasty PBMV has been used as an alternative to surgical commissurotomy for patients with severe mitral stenosis.

MATERIALS AND METHODS

To evaluate the role of balloon mitral valvoplasty in critical care of rheumatic mitral stenosis during pregnancy, analysis of 20 patients who underwent PBMV during pregnancy was done at L.T.M.G. Hospital, Sion, Bombay. The safety of the procedure in relation to maternal and foetal outcome was studied and compared to that of closed mitral commissurotomy CMC. The advantages and disadvantages of the procedure were discussed.

OBSERVATIONS AND RESULTS

Over a period of 4 years, we came across 13 cases of heart disease in pregnancy, out of which 104 patients had only mitral stenosis, or associated with minor degree of mitral regurgitation. Surgical intervention was required in 46 patients. CMC was done in 24 patients while PBMV in 20 patients. Two patients who underwent open mitral valvotomy during pregnancy are not included in the series.

BASIC DATA :

Majority of our patients were between 20-30 years of age. There were 9 primigravidas and eleven multigravidas. We did not find correlation between advanced age and parity with severity and complication rate, as reported by Szekely and Snaith. While 15 of these 20 patients were known cases of heart disease, only 7 gave positive history of rheumatic origin. In 17 patients history of heart failure or pulmonary oedema in present or past pregnancy was obtained. One patient had undergone closed mitral valvotomy three years back.

Most of these patients presented with dyspnea, orthopnea, precordial pain, palpitaion and haemoptysis. 15 out of these 20 patients were categorised as class III/IV while two were of class II according to NYHA classification.

In 12 patients the procedure was done as an emergency one, while in 8 it was done as an elective one.

Period of gestation at the time of the procedure is shown in Table I.

Table I
PERIOD OF GESTATION AT TIME OF PROCEDURE

POG (in weeks)	No. of patients
17 - 20	2
21 - 24	4
25 - 28	5
29 - 32	5
33 - 36	3
> 36	1

PRE-PROCEDURE ASSESSMENT :

Apart from routine investigations, ECG, X-ray chest, 2-D Echo and Doppler were done in these patients. Table II shows mitral valve area in these patients. Assessment of mitral valve area, left atrial size, presence of vegetations and calcification and ejection fraction was done with 2D-Echo-Doppler studies. Presence of clot in left atrium is considered as contraindication for the procedure. Mitral valve score based on thickness, mobility, calcification and subvalvular crowding was calculated. The M.V. score of less than 8 indicates pliable value, 8-11 is intermediate while more than 11 is indicative of poor results. 18 of these 20 patients in our study had mitral valve score of less than 8.

Investigations for anaesthesia fitness and foetal well being were done.

Two units of cross matched blood was reserved. Informed consent regarding possible maternal and foetal risks was taken. Patient was kept fasting overnight and intravenous antibiotics were given before the procedure. CVT surgeon and anesthetist were kept as stand by during the procedure.

PROCEDURE :

The procedure was done after stabilization of acute attack by medical treatment.

Table II
MITRAL VALVE AREA

MVA (cm^2)	No. of patients
< 0.75	3
0.8 - 1	7
1.05 - 1.5	8
1.55 - 2	2
> 2	-

The size of the balloon to be used was decided by a formula based on the height of the patient, but in our study, average size used was 26 mm.

Under local anaesthesia and sedation with abdominal shielding and fluroscopy control Inove's catheter of adequate size was passed through a sheath via right sephanous vein into the right atrium and then through the atrial septum into the left atrium. It was then passed across the mitral valve. The balloon was partially inflated with radio-opaque dye so as to inflate only the distal end and was then pulled against the valve. A pig-tail catheter was passed through the left femoral artery into the left ventricle via the aorta to measure the pressure gradient across the mitral valve, before and after the procedure. Heparin 80-100 IU/kg was given during the procedure. The balloon was then fully inflated to separate the fused commissures thus

achieving the equivalent effect of commissurotomy without thoracotomy.

2D-Echo was repeated and foetal well being was checked after the procedure.

The results of the procedure in these patients are shown in Table III. Average increase in mitral valve area was 0.9cm^2, while in most of these patients mitral valve gradient became 6-7 mm Hg after the procedure. All patients became symptomatically better within 12-24 hours. Apart from mitral regurgitation in one patient,

Table III

1. Symptomatic relief in all patients within 12-24 hours			
2. Average increase in MVA - 0.9 cm^2			
3. Decrease in mitral valve gradient to 6-8 mm Hg			
4. Complications -	Mitral regurgitation -	1	
	Artial septal defect	)	
	Cardiac tamponade	)	Nil
	Embolism	)	
	Failure of procedure	)	

Table IV
MODE OF DELIVERY

1. Normal delivery	9
2. Forceps	6
3. Vacuum	1
4. Breech	1
5. Twins	1
6. LSCS	2

Table V
FOETAL OUTCOME

1. Prematurity (37 weeks)	6
2. Low birth weight (2500 gms.)	8
3. Asphysia (APGAR 5)	2
4. Still birth	0
5. Neonatal death	1
6. Abortion	1
7. Cong. anomalies	0

none of the patients had any significant complications like embolism, tamponade or failure of procedure.

MODE OF DELIVERY :

Fourteen of these patients reached 37 weeks, while 5 delivered between 33-37 weeks. Mode of delivery in these patients is shown in Table IV.

Duration of labour varied between 5-13 hours and labour was uneventful in all patients. No cardiac complications were noted during or after labour.

Foetal outcome is summarised in Table V. Apart from one neonatal death due to prematurity with RDS, there was one spontaneous abortion at 20 weeks POG.

DISCUSSION

Pregnant patients with severe mitral stenosis and worsening symptoms of pulmonary congestion that cannot be controlled with medical therapy need mechanical relief of the obstruction.

Because of the high maternal risk of open heart surgery involving cardiopulmonary bypass with hypoxia, hypothermia and heparinization, open mitral valvotomy is not an acceptable form of treatment during pregnancy. (Vosloos. et al, 1987)

Closed mitral commissurotomy used to be the main line of treatment till now for such patient. CMC though safe and low risk operation does have anaesthesia, surgical risk, foeto-maternal morbidity and occasionally mortality.

As it can be seen from Table VI, PBMV involves much less risk and less complication rate. Thus PBMV can form a better alternative to CMC during pregnancy. Early experience with BMV as published by Palacios et al (1987) and Mckay et al (1987) has been favourable for the treatment of pregnant patients with severe mitral stenosis. The other advantage of this technique is decrease in morbidity, avoidance of anaesthesia and risk associated, fast recovery, short hospital stay and reduced cost. Thoracotomy for cardiac surgery is avoided.

To get better results and greater increase in MVA, selection of patients is important. Increased results are obtained in young

Table VI
COMPARISON

	CMC (n - 24)	PBMV (n - 20)
Prematurity	8	6
Abortion	1	1
PNM	3	1
Maternal mortality	1	-
Significant maternal morbidity	3	-

patients with normal sinus rhythm, minimal calcification and minimal subvalvular disease (MV 8). Majority of patients had all these features making them ideal candidate for BMV. BMV resulted in optimal haemodynamic changes and marked symptomatic relief. Apart from increase in MVA, fall of mitral value gradient below 8 mm Hg is indicative of successful procedure.

Radiological exposure of these pregnant patient is of major concern because of possible adverse effects on the foetus. However, 3 factors make risk of fluoroscopy acceptable.

1. The radiation exposure to the foetus is smaller when appropriate pelvi-abdominal shielding is done and furthermore low MVS of all the patients predicted that the duration of the procedure would be substantially shorter. In our study average fluoroscopy time was 220 seconds.

2. Radiation after 20 weeks post conception is unlikely to produce major abnormality in early life. (Dekabab, 1968)

3. The benefits of BMV exceed the possible risk.

Thus, the favourable results of BMV with significant low morbidity make it a treatment of choice in the critical care of pregnant patients with severe mitral stenosis.

Pregnancy per se does not change long term survival of patients with RHD provided she survives the pregnancy itself and for this survival BMV can play a vital role.

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