

## Original Article

# Pregnancy outcome in chronic rheumatic heart disease

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### Abstract

**Objectives:** 1. To study the pregnancy outcome in chronic rheumatic heart disease (CRHD) 2. To evaluate the perinatal outcome of percutaneous balloon mitral valvuloplasty (PBMV) done during pregnancy. **Methods:** Three hundred sixty three women with cardiac disease were admitted and evaluated, 330 delivered from 2003-2007 at GMH, Nayapul, Hyderabad. Among them, 60.6% women had CRHD and 32.1% had congenital heart disease. **Results:** 80.5% of the women had single valve involvement with predominant mitral stenosis (MS) in 48.5% and 28% were in New York Heart Association (NYHA) class III and IV. 66.5% (133/200) were diagnosed during index pregnancy. 73.5% had vaginal delivery – 30 (15%) had induced labor. Out of the 32 women who had PBMV, 25 underwent surgery during pregnancy. The perinatal mortality rate (PNMR) was 8.31% in this group and 27.2% in women with severe MS without PBMV (n=11). In NYHA class I & II, the perinatal mortality was 3.4% and in class III & IV it was 14.28%. **Conclusions:** PNMR was 6.4% and maternal mortality was 0.89%. PBMV in pregnancy reduced the perinatal mortality in severe MS.

**Key words:** chronic rheumatic heart disease (CRHD), percutaneous balloon mitral valvuloplasty (PBMV).

### Introduction

Heart disease complicates 0.5% to 4% of all pregnancies<sup>1</sup>. Presence of heart disease increases the risk of adverse maternal and fetal outcome. Neonatal complications were noted in 20% of the pregnancies with heart disease<sup>2</sup>. The prevalence of pregnancy complicated by rheumatic heart disease has decreased in developed countries and the former ratio of 3:1 for rheumatic to congenital heart disease is now

reversed<sup>3</sup>. But rheumatic heart disease continues to contribute significantly to maternal mortality and morbidity in the developing world.

In India, heart disease is diagnosed mostly in pregnancy for the first time, when increased demands on the heart trigger symptoms<sup>4,5</sup> and unmask cardiac disease. Maternal mortality varies directly with functional class, 0.4% for New York Heart Association (NYHA) class I and II and 6.8% for class III and IV<sup>6</sup>. Mitral stenosis is associated with a maternal mortality of 10% and even up to 50% in NYHA class III and IV. If atrial fibrillation is present, the risk of mortality rises by another 5-10%<sup>7</sup>.

**Material and Methods:** Rheumatic heart disease was seen in 200 women out of 330 (60.6%) and congenital heart disease was seen in 106 women (32.12%). The

*Paper received on 30/07/2007 ; accepted on 02/09/2007*

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ratio of rheumatic to congenital heart disease was 1.88:1 (200:106) in our series. Other forms of heart diseases like peripartum cardiomyopathy, ventricular arrhythmias, and bundle branch block were seen in 24 women (7.27%).

All the women were given benzathine penicillin 12 lakh units every 3 weeks. Pregnancy was allowed to continue to term and spontaneous labor was awaited. Labor was induced for obstetric indications only. All were given infective endocarditis prophylaxis. Second stage was shortened by outlet forceps when necessary. Frusemide 40mg IV was given routinely at the end of 2<sup>nd</sup> stage of labor to minimize the effects of auto transfusion of 500ml blood. Caution was exercised in the usage of drugs to prevent postpartum hemorrhage.

Injection methylergometrine was avoided after delivery. Prophylactic obstetric measures like slow delivery of the fetal trunk, watching for signs of placental separation, gentle cord traction and counter traction, gentle uterine massage and immediate suturing of the episiotomy wound would help minimize postpartum blood loss. In the even of PPH concentrated oxytocin drip was used. All were observed in the intensive care unit for 48 hours after delivery.

Both maternal and perinatal outcome were documented for each patient. All neonates less than 2.5 kg were taken as low birth weight and deliveries between 28 and 37 weeks were considered as preterm.

## Results

Ninety five percent (190/200) of the women were in the age group of 20-30 years. Sixty percent (120/200) were multigravidae and 40% (80/200) were primigravidae. At the time of admission, 28% (56/200) were in class III & IV, out of which 25 underwent PBMV in pregnancy. Eleven women with severe MS did not undergo PBMV. The remaining 20 women had other valvular lesions with or without MS.

During the index pregnancy, 66.5% (133/200) had their heart disease diagnosed. 80.5% (161/200) had single valve involvement (mitral), 48.5% had predominant MS, 38.5% (77/200) had predominant MR, and 13% (26/200) had both MS and MR (Table 1).

PBMV: PBMV was done prior to the present pregnancy in seven women ranging from five months to ten years before the index pregnancy. Twenty five women

underwent PBMV in pregnancy for severe symptomatic MS with class III and IV at Osmania General Hospital, Hyderabad. The selection criteria used were similar to that of AIIMS (Mishra et al), i.e. absolute mitral valve area <1 cm<sup>2</sup>, pliable valve, mild or no mitral regurgitation, absence of left atrial clot, NYHA class III & IV and duration of pregnancy greater than 20 weeks.

After PBMV in pregnancy three women developed moderate mitral regurgitation and one woman developed deep vein thrombosis in the right lower limb two days after the procedure.

**Table 1. Maternal and disease characteristics n=200.**

	No.	%
Primiparas	80	40%
Multiparas	120	60%
Single valve involvement	161	80.5%
Multiple valve involvement	39	19.5%
MS predominant	97	48.5%
MR predominant	77	38.5%
NYHA I and II	144	72%
NYHA III and IV	56	28%

## Mode of delivery

Among the study group, 73.5% (147/200) had vaginal delivery and 26.5% (53/200) had cesarean section for obstetric indications. One hundred and sixteen had spontaneous labor (58%), 30 women (15%) had undergone induction of labor for PIH, pregnancy past dates, PROM and term gestation. The methods of induction employed were PGE2 gel (3); modified oxytocin drip (15) and subcutaneous syntocinon (12). There were no maternal complications attributable to induction of labor in our study. Fifty three women (26%) underwent cesarean section for obstetric indications. Graded epidural anesthesia was the preferred anesthesia in our study 43/53 (83%). Five were done under general anesthesia and four were done under spinal anesthesia (Table 2).

## Perinatal outcome

There were 203 deliveries in 200 pregnancies (3 pairs of twins) with 93.59% (190/203) live birth rate. There were

13 perinatal losses (seven IUFD, two still births and four neonatal deaths), the perinatal mortality being 6.4%. The Preterm and IUGR rates were 9.3% each. There were 76 low birth weight babies (37.43%). The perinatal mortality was 3.4% (5/147) in class I and II, and 14.28% (8/56) in NYHA III and IV. The perinatal mortality was 8% (2/25) in severe MS cases who had PBMV in pregnancy and 27.27% (3/11) in women who did not have PBMV. The incidence of preterm labor was 6.12% in NYHA class I and II, and 17.85% in class III and IV. The incidence of low birth weight was 34.69% in NYHA class I and II, and 44.64% in class III and IV.

**Table 2. Delivery characteristics and perinatal outcome Total deliveries n=200 (3 sets of twins)**

	No.	%
Labor	116	58
a. spontaneous	30	15
b. induced vaginal deliveries	147	73.5
Cesarean section	53	26.5
Live babies	190	93.5
IUFD	7	3.44
Still birth	2	0.98
Neonatal death	4	1.97
Perinatal mortality	13	6.4
IUGR	19	9.35
Preterm	19	9.35
LBW	76	37.43
NICU	55	27.09

### Maternal outcome

Cardiac complications were observed in 29 pregnancies (14.5%). Twenty two (11%) women had cardiac failure either CCF or LVF. 81.8%(19/22) women were in NYHA III and IV. Three women (2.1%) in NYHA class I and II developed cardiac failure later in pregnancy. Three (1.54%) women had atrial fibrillation. Four (2%) women had sequelae of thromboembolism, one had left atrial clot, one had old MCA infarct and two had hemiparesis.

Anticoagulants in pregnancy: Four women were on anticoagulants, three were on heparin (one mitral valve replacement, one LA clot, one post PBMV DVT) and one woman with prosthetic mitral valve was on warfarin and presented irregularly for antenatal care.

Obstetric risk factors: One hundred out of the two hundred (50%) pregnancies were complicated by obstetric risk factors in our study. Pregnancy induced hypertension was seen in 18% (36/200), anemia in 7.5% (15/200). Eighteen (9%) women had associated medical problems. One woman had toxic nodular goiter on propyl thiouracil and four women had basal pneumonitis. One woman was HIV+Ve and one had documented pulmonary kochs on ATT. Two women had bronchial asthma and two had hypothyroidism (Table 3).

**Table 3. Obstetric risk factors n=200.**

	No.	%
PIH	36	18
Anemia	15	7.5
Post cesarean	20	10
Rh negative	11	5.5
Twins	3	1.5
Oligohydramnios	2	1
Fibroid complicating pregnancy	2	1
Postdated pregnancy	6	3
Breech	4	2

### Maternal mortality

There was no maternal mortality in the 200 women who delivered at our institute but there were two maternal deaths out of 224 CRHD women evaluated or admitted in our institute (0.9%).

1. A 36 year old woman P5 L5 with CRHD having severe MS with mitral valve area <1cm<sup>2</sup> was evaluated and advised PBMV at 28 weeks. The woman who never reported back, had a home delivery and postpartum hemorrhage, was referred again to our institute 12 days after delivery with severe anemia in congestive cardiac failure. She died three hours later.
2. A 20 year old primigravida with severe MS, moderate MR, mild AR and severe PAH died undelivered at 36 weeks gestation due to suspected cerebral embolism (Table 4).

**Table 4. Perinatal and maternal complications in various sub groups of CRHD.**

S. No.	Complication	Total		NYHA I & II		NYHA III & IV		Severe MS with PBMV in index pregnancy		Severe MS without PBMV	
		n1=200 n2=2003		n1=144 n2=147		n=56		n=25		n=11	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.	LBW	76	37.43	51	34.69	25	44.64	8	32	8	72.72
2.	Preterm	19	9.35	9	6.12	10	17.85	3	12	-	-
3.	IUGR	19	9.35	13	8.84	6	10.71	-	-	-	-
4.	Live birth	190	93.59	142	96.59	48	85.71	-	-	-	-
5.	IUD	7	3.44	2	1.36	5	8.92	2	8	1	9.09
6.	Still Birth	2	0.98	1	0.68	1	1.78	-	-	-	-
7.	NND	4	1.97	2	1.36	2	3.57	-	-	2	18.18
8.	PNM	13	6.40	5	3.40	8	14.28	2	8	3	27.27
9.	CCF	22	11	3	2.08	19	33.92	3	12	9	81.81
10.	AF	3	1.5	-	-	3	5.35	-	-	3	27.27
11.	LA clot	1	0.5	-	-	1	1.78	-	-	1	9.09

n1=No. of women & n2=No. of babies

LBW=Low birth weight, IUFD = Intrauterine fetal death, NND=Neonatal death, PNM=perinatal mortality, CCF=Congestive cardiac failure, AF=Atrial fibrillation, LA Clot= Left atrial clot

**Table 5. Maternal and perinatal outcome in CRHD: Comparative studies.**

Name & Year	No. of Cases	Class III&IV %	CCF %	TE %	Maternal Mortality %	Vaginal Delivery %	Preterm %	LBW %	IUF %	Still %	NN %
Sawhney 2003 PGI Chandigarh	500	22.6	2	0.8	2	86	-	-	-	2	-
Hameed 2001 California, USA	66	3	38	-	2	92	-	21	-	2	-
Asghar 2005 Pakistan	33	-	21.2	2	-	91.41	-	42.55	-	-	-
Barbosa 2000 Brazil	45	5.1	-	2.3	2.3	-	-	29.4	-	-	-
D. Pratibha et al. 2007, GMH, Hyderabad	200	28	11	2	0.89	73.5	9.35	37.43	3.44	0.98	1.97

## **Discussion**

The incidence of rheumatic heart disease is still high in developing countries like India. At the Government Maternity Hospital, Nayapul, during a period of four and a half years from 2003 to 2007, the incidence of heart disease was 0.42% (330/78, 232). In a study by Asghar<sup>5</sup>, the incidence of heart disease was 0.98%.

The incidence of CRHD in PGI Chandigarh<sup>3</sup> during a 12 year period was 2.4%. At our institute CRHD was seen in 0.25% (200/78, 232) patients. The ratio of rheumatic heart disease to congenital heart disease in our study was 1.88:1. In a study in Pakistan<sup>5</sup> the ratio was 3:1. Mitral stenosis (MS) was the predominant lesion in many studies, being 69.6%, 89.2% and 42% respectively<sup>2,3,5</sup>. In our study also MS was predominant in 48.5% of the cases. Mitral valve was most commonly involved in 80.5% of the women in our study.

Early detection, evaluation and prevention of precipitating factors are important in reducing complications. In the index pregnancy, 66.5% of the women were diagnosed to have heart disease. The pickup rate of organic cardiac murmurs in the antenatal OPD was high at our institute. Pregnancy serves the purpose of screening young women for cardiac lesions. In a study by Hameed et al<sup>2</sup>, 30.3% of the women were diagnosed to have heart disease in the index pregnancy.

The functional class has a direct bearing on both the maternal and fetal outcome. Twenty eight percent of the women in our study were in NYHA class III and IV compared to 22.3% in a series by Sawhney<sup>3</sup>.

In our study, 73.5% of the women had vaginal delivery as compared to 86%, 91.42%, and 92% in other studies<sup>2,3,5</sup>. Cesarean section (26.5%) was done only for obstetric indications. Forceps assisted delivery was performed in 34% of the vaginal deliveries. In our study, 15% of the women underwent labor induction as compared to 39%<sup>6</sup>, 4.25%<sup>5</sup> and 8.4%<sup>3</sup> in other studies.

Graded epidural anesthesia using small increments by skilled anesthetists can be employed in most cases of NYHA class I and II. Severe mitral stenosis or aortic stenosis or any valvular lesion with NYHA class III and IV are better managed by general anesthesia<sup>7</sup>. In our study, 83% of the cesarean sections were done under graded epidural anesthesia.

Congestive cardiac failure was seen in 22 women (11%)

as compared to 38% in the series by Hameed<sup>2</sup> and 20% in the study by Asghar<sup>5</sup>. Thromboembolism was seen in 2% of our cases which is similar to the incidence reported by Barbosa (2.3%)<sup>11</sup> and by Asghar (2%)<sup>5</sup>. Overall cardiac complication rate in our study was 14.5% which is very similar to 13% reported by Siu et al<sup>13</sup>.

## **PBMV in pregnancy**

A recent review<sup>8</sup> of the outcome of cardiovascular surgery in 161 pregnant women, of whom 59 were operated on for native valve disease, reported maternal mortality of 9% and fetal or neonatal mortality of 29%. In contrast to the high maternal and fetal risk seen in valvular surgery like open mitral valvotomy, PBMV in recent years has been found to be a safe alternative with good maternal and perinatal outcome in women with severe symptomatic MS<sup>3,9-12</sup>.

In our series, 25 women underwent PBMV for severe symptomatic MS during pregnancy following selection criteria of Mishra et al<sup>9</sup>. All the women improved by at least one functional class compared to 82% in the Chandigarh study<sup>3</sup>. Some authors have advocated PBMV for severe MS with mitral valve area less than 1 cm<sup>2</sup> for all classes (I,II,III,IV)<sup>10</sup>. But a review article by Elkayam et al<sup>12</sup> has concluded that, PBMV should be done in severe symptomatic women with MS who do not respond to medical therapy.

Complications after PBMV: The global incidence of major complications was about 12%<sup>14</sup> and mortality ranges between 0-3%. The major causes of death are cardiac tamponade, severe MR and deterioration of the woman's general condition. Hemopericardium has been reported in 1-3%, systemic embolism in 0.5-3% and significant ASD in 1-2%<sup>14</sup>.

Initiation of uterine contractions and preterm labor have also been reported. This procedure is associated with some risk to the fetus secondary to unavoidable ionizing radiation. The procedure should therefore, be avoided if possible during the 1<sup>st</sup> trimester and should be performed by experienced operators with adequate abdominal and pelvic shielding with minimum radiation exposure and under echocardiographic guidance, when possible.

In our series, the maternal mortality was 2/224 (0.9%). Sawhney reported a maternal mortality rate of 2%, 8 of which occurred in NYHA class III and IV<sup>3</sup>. Barbosa<sup>11</sup> reported a maternal mortality of 2.3% in 45 pregnancies of rheumatic mitral stenosis (Table 5).

### Perinatal outcome

The low birth weight rate was 37.4% in our series compared to 29.4% in Barbosa's study<sup>11</sup>. Preterm labor was seen in 9.3% in our study. The corresponding incidence in other studies was 14%<sup>5</sup>, 12%<sup>3</sup> and 23%<sup>2</sup>. In our study, intrauterine growth restriction was seen in 9.3% compared to 18.2%<sup>3</sup> and 21%<sup>2</sup> in others. There was a significant difference in the perinatal outcome between NYHA class I, II and III, IV in our study. The perinatal mortality rate in our series was 3.4% in class I and II compared to 14.28% in class III and IV. The perinatal mortality in Sawhney series<sup>3</sup> in class I & II was 1.5% and 3.5% in class III and IV. Hameed reported a still birth rate of 3% in 66 pregnancies, 97% of the women were in class I and II. Siu<sup>13</sup> reported a perinatal death rate of 2% (96% were in class I and II and 4% in class III and IV).

In our study the perinatal mortality was 8.31% in women with severe MS who underwent PBMV during pregnancy and 27.2% in women with severe MS who did not undergo PBMV.

From our series we conclude that the maternal and perinatal outcome in women with rheumatic heart disease depends mainly on the functional cardiac status during pregnancy, the risk being greater in NYHA III and IV. Our study shows that, PBMV in pregnancy improves the functional class and also improves the perinatal outcome compared to women with severe MS, class III and IV. If the complications associated with PBMV can be reduced, then it can be considered as an effective option especially in those women diagnosed as tight MS during the index pregnancy. In view of the high risk of low birth weight, preterm delivery, intrauterine growth restriction, IUD and still birth, antenatal fetal surveillance becomes mandatory and should be offered to these women with CRHD.

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