

Original Article

Pregnancy in cases of congenital heart disease

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Abstract

Objective: To evaluate the maternal and fetal risks in women with various types of congenital heart disease. **Methods:** 348 women with various types of heart disease delivered during a period of 4 years 8 months from January 2003-August 2007. This is a prospective study of pregnancy outcome in 112 women with congenital heart disease. The ratio of CRHD:CHD was 1.91:1. **Results:** The various common cardiac lesions were ASD-33, VSD-28, PS-9, co-arctation of aorta-8, PDA-7, TR-6, myxomatous mitral valve-6, bicuspid aortic valve-4, TGA-3 and TOF-3. We had more Muslim women with CHD in our study. 96.43% were in NYHA class-I, 53.13% were diagnosed in the index pregnancy, 20.54% had prior surgical correction, 62.39% delivered vaginally and 37.62% had Cesarean section. Live births were 98.18%. **Conclusions:** PNM was 1.81%. MMR was 1.78%. A high rate of PIH-23.63%, LBW-44.54% and IUGR-38.18% were noted. We have routinely advocated IE prophylaxis in CHD. PPH which causes hypotension should be avoided at all costs.

Key words: congenital heart disease (CHD), pregnancy with ASD, VSD

Introduction

The incidence of pregnant women with congenital heart disease (CHD) is increasing as a consequence of progress in the fields of diagnostic techniques and surgical intervention improving their long term outcome. The former ratio of RHD:CHD 3:1 is now reversed¹. Maternal cardiac and neonatal complications in these women are considerable. The course of pregnancy as well as maternal and fetal morbidity and mortality are dependant on both the underlying defect and the functional maternal state². The 4 predictors of primary

cardiac events are prior cardiac event (heart failure, transient ischemic attack, or stroke before pregnancy) or arrhythmia; baseline NYHA class>II or cyanosis; left heart obstruction (mitral valve area <2cm², aortic valve area <1.5cm² or peak left ventricular outflow tract gradient >30mm Hg by echocardiography); and reduced systemic ventricular systolic function EF<40%³.

Methods

Three hundred forty eight women with various types of heart disease delivered during a period of 4 years 8 months from January 2003-August 2007 at GMH, Nayapul, Hyderabad. Two hundred twelve women (60.91%) had RHD and 112 (32.18%) had CHD, 24 (6.89%) women had other forms of heart disease. The ratio of RHD:CHD delivered in our institute was 1.91:1. This is a prospective study of pregnancy outcome in 112 women with congenital heart disease. The type of lesion, the timing when the lesion was detected, whether

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it was surgically corrected or not; functional cardiac status associated medical complications like anemia, chronic hypertension, respiratory tract infections; cardiovascular complications like cardiac failure, arrhythmias, infective endocarditis, thromboembolic complications; obstetric risk factors like PIH, preterm labor, PROM, oligoamnios, APH, mode of delivery, type of anesthesia, maternal outcome and perinatal outcome like LBW, IUGR, preterm baby, congenital malformations and perinatal mortality were evaluated.

Pregnancy was allowed to continue to term and spontaneous labor was awaited unless labor intervention was dictated for cardiovascular or obstetric indications. Two patients had MTP. All were given infective endocarditis (IE) prophylaxis. Frusemide 40 mg IV was given at the end of 2nd stage of labor except in patients with AS. Routine administration of injection methyl ergometrine was avoided after delivery. Concentrated oxytocin drip was used slowly to prevent PPH when necessary.

Observations

ASD was the commonest cardiac lesion diagnosed in our study 33/112 (29.46%) (Table 1). Among the subjects 83.04% (93/112) were in the age group of 20-25 years. Primis were 52.68%. Majority of our patients were in NYHA class-I and II-97.32% (109/112). In our study, 23 women (20.54%) had surgical correction of the cardiac lesion prior to pregnancy. The ratio of Hindus to Muslims delivering in our hospital is 1:0.365. We had in our study more number of Muslim women with CHD who delivered; the ratio of Hindu to Muslim women with CHD being 44:68, 1:1.55, which is statistically significant. Further studies are needed to find out whether CHD is more frequent in Muslim women.

Drugs - 18 women (16.07%) were on tablet Digoxin 0.25 mg. Seven pregnant women (6.25%) who had chronic HTN were on tablet Atenolol prior to pregnancy and were changed to Nifedipine and Alphamethyldopa during pregnancy; 6 (5.36%) were on diuretics.

Obstetric Risk factors (Table 2). One patient with VSD had placental abruption and immediate postpartum collapse. She recovered after volume replacement and one unit of blood transfusion.

Mode of delivery (Table 3). In our study of 112 cases of CCHD, 109 women delivered. One woman died during labor and two had MTP. Labor was induced for obstetric

indications in 13 patients (11.93%), seven patients were induced with concentrated oxytocin drip, five with subcutaneous oxytocin half hourly half unit for six doses and one with PGE₂ gel. Out of these 11 had vaginal delivery had two had LSCS. Out of 109 the women who delivered, 62.39% had vaginal delivery and Cesarean section was done in 37.6% mostly for obstetric indications. Cardiac indications were coarctation of aorta in six and primary pulmonary hypertension in one. Cesarean section was done under epidural anesthesia in 25 (60-98%), graded epidural in six (14.63%), general in six (14.63%) and spinal anesthesia in four (9.78%).

Termination of pregnancy was needed in two cases. MTP + sterilization was done under epidural anesthesia in a G₂P₁L₁ with uncorrected coarctation of aorta at 14 weeks gestation for severe uncontrolled chronic HTN. Termination of pregnancy was done in another patient with uncorrected tetralogy of fallot when fetal omphalocele major was diagnosed at 18 weeks of gestation. Extra amniotic instillation of ethacridine lactate was done.

Perinatal outcome. We had a total of 109 delivered with one set of twins. Live birth rate in our study was 98.18%. We had a high percent of LBW 44.54% (49/110) and

Table 1. Maternal heart disease characteristics N=112.

Type of lesion	No.	%	No. of surgically corrected lesions
ASD	33	29.46	10
OS-32, OP-1			
VSD	28	25.00	6
PS	9	8.04	-
CA	8	7.14	4
PDA	7	6.25	1
TR	6	5.36	-
MVP myxomatous	6	5.36	-
Bicuspid AV	4	3.57	-
AS-3, AR-1			
TGA	3	2.68	-
TOF	3	2.68	2
Primary pulmn.HTN	1	0.89	-
Ebstein's anomaly	1	0.89	-
Truncus arteriosus	1	0.89	-
Cortriatriatum	1	0.89	-
Situs inversus totalis	1	0.89	-

Table 2. Obstetric Risk Factors n=110 MTP =2.

Risk Factor	No.	%
PIH	26	23.63
Previous LSCS	20	18.18
Anemia	15	13.63
BOH	13	11.81
Postdates	13	11.81
CPD	12	10.91
Preterm labor	11	10.0
Rh -ve pregnancy	10	9.09
Chronic HTN	4	3.63
Age >30 years	4	3.63
Grand multipara	4	3.63
Chronic HTN	3	2.72
Superimposed PET PROM	3	2.72
Oligoamnios	3	2.72
Breech	3	2.72
Low lying placenta	1	0.90
Placental abruption	1	0.90
Hydramnios	1	0.90
Twins	1	0.90

Table 3. Delivery characteristics and perinatal outcome.

	No.	%
SPVD	58	53.21
Outlet forceps	10	9.17
Total vaginal deliveries	68	62.39
LSCS	41	37.61
Live babies	108	98.18
LBW	49	44.54
IUGR	42	38.18
Preterm baby	11	10.00
Congenital malformations	02	1.81
NICU admission	45	40.91
IUD	01	0.91
NND	01	0.91
PNM	2	1.81

No. of deliveries n1=109, No. of babies n2=110,
MTP = 2, 1 died undelivered
Total n=112

Table 4. Maternal and perinatal outcome in CHD : Comparative studies.

Name & year	No.of pregnancies.	CCF	Arrhythmias	PIH	PTL	IUGR	IUD	NND	PNM	MM
Paul Khairy, David W. Ouyang et al. 1998-2004 Boston	90	Pulm. Edema 12 (16.7%)	2 (2.8%)	2 (2.8%)	15 (20.8%)	6 (8.3%)	2 (2.8%)	1 (1.4%)	3 (4.2%)	Nil
Willem Drenthen, Petronella G. Pieper, 1985-2007 Netherlands	2491	79 (4.8%) 1663 Pregn	70 (4.5%) 1562 Pregn	89 (8.7%) 2087 Pregn	224 (15.9%) 1413 Pregn	110 (8%) 1381 Pregn	31 (1.7%) 1776 Pregn	-	41 (2.3%) 1756 Pregn	-
Sidlik, Rakefet 2002 Israel	156	-	3 (1.92%)	-	-	-	-	-	2 (1.3%)	-
D. Pratibha, Y.Srilakshmi 2003-2007 GMH, Hyderabad	112	1 (0.91%)	4 (3.57%)	26 (23.63%)	11 (10%)	42 (38.18%)	1 (0.91%)	1 (0.91%)	2 (1.81%)	2 (1.78%)

IUGR babies 38.18% (42/110). Ten percent were preterm babies, of which two had congenital malformations. One patient with transposition of great arteries (TGA) with VSD and congenital heart block delivered a baby with spinal dysraphism and sacral meningocele. Fetal omphalocele major was diagnosed in a case of TOF.

PNM in our study was 1.18% (2/110). One patient with VSD was admitted with IUD in active labor (2.4kg). She did not have regular antenatal checkup. Another was an early NND, delivered by LSCS for fetal distress.

There were two maternal deaths in 112 cases of congenital heart disease complicating pregnancy. G₂P₁L₁ with one previous LSCS with postdatism with ASD was admitted in early labor. Emergency LSCS with sterilization was done under epidural anesthesia. She had excessive blood loss during surgery due to involvement of the uterine vessel on one side and went into CCF in the post operative period. One unit of packed cell transfusion was given along with antifailure measures but patient could not be saved. The second maternal death was a primigravida with bicuspid aortic valve with moderate AS who was admitted in early labor at term. She developed ventricular fibrillation in active labor and emergency resuscitation was done. Electrical cardioversion was performed but patient died undelivered.

Discussion

ASD was the predominant cardiac lesion detected in our study (29.46%). In our series, 7.14% has cyanotic cardiac lesions (TGA-3, TOF-3, TA-11 and Ebstein's anomaly-1) but none of them had cyanotic spells. In our study 97.32% were in NYHA class I & II compared to 99.1% in the study by Sidlik, et al⁴.

Due to high maternal mortality, termination of pregnancy is indicated preferably in the first trimester in cases with Eisenmenger's syndrome, pulmonary arterial HTN, severe left heart obstructive lesions and Marfan's syndrome with aortic root diameter >4 cms⁵. Termination of pregnancy would be needed in major congenital fetal anomalies. Medical abortion with oral antiprogesterones and vaginally administered prostaglandins is probably contraindicated because the hemodynamic effects (systemic vasodilation with hypotension, increasing cyanosis, heavy bleeding and retention of products with infection) are unpredictable⁵.

MTP was done for two cases in our study (1.79%) compared to 5%⁶ and 7.8%⁷. Miscarriages have been

reported in 12.2%⁷ and 15%⁶ in CHD. In our study the incidence of PIH was high 23.63% compared to 8.7%⁶ and 2.8%⁷ reported by the others. Endothelial dysfunction is present in patients with CHD. Activation of neuro-hormonal pathways and oxidative stress are other factors responsible for the increased incidence of PIH in patients with congenital heart disease⁶. In our study, 10% had preterm labor which is the same as in general population (10-12%). Preterm delivery rate of 16%⁶ and 20.8%⁷ have been reported in other studies.

Maternal cardiac complications included heart failure in one case (0.89%) and arrhythmias in four cases (3.57%) in our series compared to 4.8% heart failure and 4.5% arrhythmias in the meta analysis study⁶ and 16.7% pulmonary edema and 2.8% arrhythmias in the study by Khairy et al⁷.

Endocarditis prophylaxis should be considered in most patients with CHD irrespective of the mode of delivery⁵. Infective endocarditis (IE) prophylaxis was given to all the women and none had endocarditis in our study compared to 0.5%⁶ and 7%⁸ in other reports. Thromboembolic complications were reported in 2.2%⁶ and 4.5%⁸ by others. Presbitero et al⁸ reported one patient with TOF with an open Blalock anastomosis who died with streptococcus fecalis endocarditis, 2 months after vaginal delivery by forceps and was not given IE prophylaxis. This supports the absolute need of IE prophylaxis.

In our study, we had a high rate of IUGR (38.18%) compared to 8%⁷. In spite of this high incidence of IUGR, the PNM in our study was only 1.81%. Maternal CHD was found as an independent risk factor for neonatal malformations⁴. In our study two babies had congenital malformations (1.82%) compared to 17.5% in the study conducted by Sidlik et al⁴.

The recurrence rate of CHD is reported as 7.1%⁷ and 6.5%⁴. A recurrence rate of 8% in atrio ventricular septal defect and 0.6% in TGA has been reported⁶. We had a maternal mortality rate of 1.78%.

Coarctation of aorta – Coarctation of aorta accounts for 6-8% of the patients with CHD. The incidence of coarctation of aorta in our study was 7.14% (8/112). Superimposed pre-eclampsia was noted in 3/8 (37.5%) of these patients. In our study, out of the seven cases of coarctation of aorta, six had LSCS and one had vaginal delivery though four had corrected coarctation. Vriend et al⁹ reported a C section rate of 6% in 98 successful

pregnancies with corrected coarctation of aorta. None of the babies had CHD in our study compared to 4%⁹.

Cyanotic CHD – Maternal cyanotic cardiac lesions lead to an impaired uteroplacental perfusion and diminished fetal oxygenation. Women with cyanotic CHD have a high incidence of miscarriages, premature births and LBW babies. In a study of cyanotic CHD, 43% live births and 37% premature births were reported⁸. We had 9 cases of cyanotic CHD. All of them had live births and none had bacterial endocarditis.

With the introduction of ‘Arogya Sri’ health scheme in the State of Andhra Pradesh wherein the expenditure for surgeries of congenital cardiac lesions is being financed by an insurance company, after a decade we would notice more number of surgically corrected congenital heart disease cases. The number of lesions being diagnosed in the index pregnancy also would come down.

Conclusions

Perinatal mortality in our study was 1.81% and maternal mortality rate was 1.78% (Table 4). A high rate of PIH 23.63%, LBW babies 44.54% and IUGR 38.18% were noted.

We have routinely advocated infective endocarditis prophylaxis in congenital heart disease. Postpartum hemorrhage which causes hypotension should be avoided at all costs as this would lead to tachycardia and may precipitate heart failure.

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