Study of Pregnancy Outcome in Maternal Heart Disease

I. Indira[1], K.Sunitha[2] and Jyothi

Assistant Professor[1]Assistant Professor[2] and Consultant Obstetrician& Gynecologist[3]
Department of Obstetrics and Gynecology, S.V.Medical College, Tirupati, Andhra Pradesh, India

Abstract: *Heart disease complicating pregnancy is an important indirect cause of maternal mortality. The present study aims to know the prevalence, aetiological factors, type of lesion, maternal and fetal outcome in pregnancies complicated by heart disease. The prevalence in the study period was 0.43 %. Rheumatic heart disease was the commonest aetiological factor, followed by congenital heart disease. Mitral stenosis was the commonest lesion is the rheumatic group and atrial stenosis was the commonest lesion in the congenital group. Maternal and fetal outcome was good in the NYHA functional class I and II and guarded in the class III and IV . Maternal deaths were 6% in the series and all of them happened in unbooked, previously undiagnosed cases coming to the hospital for the first time in labor or in cardiac failure.*
Key words*: Cardiac Failure, congenital heart disease, heart disease, Pregnancy and rheumatic heart disease,*

I. Introduction

Pregnancy makes a significant demand on the cardiovascular system. About 15-52% of cardiac abnormalities is first diagnosed during routine antenatal examination or because of symptoms brought about by the physiological changes of pregnancy[1].Cardiac disease in the pregnant woman can present a challenge to the obstetrician, cardiologist and neonatologist. The spectrum of cardiovascular disease is changing and varies between countries[2]. At present   0.2 - 4% of all pregnancies in western countries are complicated by cardiovascular disease[3]. In the developed countries, because of a marked decline in the incidence of rheumatic heart disease, congenital heart disease accounts for most of the cardiac disease in pregnancy[4].Surgical correction of congenital heart disease has enabled many women to reach the child bearing age in western countries[5].Maternal functional status is a most important predictor of outcome and most often defined by NYHA functional class[6]. Poor functional status and cyanosis are mostly associated with adverse maternal and neonatal outcome[7]. Gestational diabetes, preeclampsia, preterm birth and small for gestational age babies are the major risk factors for maternal heart disease[8]. In under developed countries, anemia is a major associated factor that precipitates heart failure. In the developed countries, as other   causes of maternal deaths have shown a decline, heart disease complicating pregnancy has become an important cause of maternal mortality[9]. Pregnant women with cardiac disease fall into two categories.
1.   Those with diagnosed heart disease and under treatment even before becoming pregnant
2.   Those with previously undiagnosed heart disease

Cardiac lesions and pregnancy both may affect each other adversely. Joint care of obstetrician, cardiologist and anesthetist, avoidance of   complications that add to the burden on the heart and compliance of the patient and her family to regular follow up will go a long way in ensuring a safe outcome for mother and fetus.

II. Aims and Objectives
1.   To know the incidence of heart disease among pregnant women during the study period.
2.   To know the various etiological types of heart disease.
3.   To study the factors affecting maternal and fetal outcome in heart disease complicating pregnancy.

III. Materials and Methods

The present study was done at the government maternity hospital attached to Sri Venkateswara Medical College, Tirupati. It is a referral hospital catering to a large obstetric population spread across four districts. Total number of deliveries during the study period was 14,002. In the present study, 60 patients with cardiac disease complicating pregnancy were studied over a period of 18 months from January 2006 to June 2007. These included booked cases in the antenatal O.P.D. and unbooked emergency cases. The women were divided into three broad groups - Rheumatic heart disease, congenital heart disease and miscellaneous. All the groups

were subdivided in to surgically corrected group and non-corrected group. The congenital heart disease group was also classified into two categories - those with cyanotic lesions and those with acyanotic lesions. The above groups were studied for maternal morbidity, maternal mortality, pre-term birth, intrauterine growth restriction and intrauterine fetal death.

The patients were regularly seen at the antenatal clinic and were also seen regularly by a cardiologist. The frequency of the patients' visits to the hospital varied from weekly to monthly, depending on the cardiac status and the duration of gestation. History of occurrence of Rheumatic fever in childhood or adolescence was elicited. A detailed medical history and obstetric history were taken. Functional class of the patient before the present pregnancy was determined. Data on the present pregnancy was collected. At each visit, a functional grading was made according to the criteria of the New York Heart Association. A detailed clinical examination was performed. Obstetric examination was done to note the height of the uterus and to detect any intrauterine growth restriction. A search was made for symptoms and signs of infections anywhere in the body, such as chest, urinary tract and cervicovaginal infections and if found, these were vigorously treated. Patients were advised on the importance of taking adequate rest. They were given Iron and Folate supplements.

Investigations: Routine investigations like Hemoglobin, Blood group and Rh type, Blood sugar, VDRL, urinalysis and urine culture was done in all the patients. X-ray chest posterior anterior view, if necessary, was taken with an abdominal shield. Electrocardiography and Echocardiography were done in all the patients and the clinical diagnosis was confirmed.

Management: Prophylaxis against rheumatic fever was given in patients with rheumatic heart disease. Benzathine penicillin 1.2 million units IM was given every month. Patients in New York Heart Association classes I and II and those whose signs confirmed that their cardiac lesions were mild, were admitted to the hospital at 38 weeks for bed rest and remained for two weeks following delivery. Patients in class HI and IV were admitted in the second trimester and remained in the hospital until two weeks after delivery. If any deterioration in the patient's condition occurred, hospitalization was recommended.

Patients whose pulse rate exceeded 100/minute were kept on tablet digoxin 0.25 mg/day for five days a week. Heart failure was treated with digoxin and diuretics. Arrhythmia was treated with drugs alone. Any complication was treated as per the advice of the cardiologist. Labor was induced only for the most stringent obstetric indications and likewise Cesarean section was performed only when there was a clear obstetric indication, Augmentation of labor was done by low amniotomy alone in the active stage of labor. Oxytocin in concentrated drips was given if necessary.

All the patients were sedated in the first stage of labor with Injection Tramadol hydrochloride 50mg or 100mg to allay anxiety and apprehension. The patient was kept in semi-recumbent position and given nasal oxygen if she was dyspnoeic. Whenever the second stage of labor exceeded an hour or whenever there was maternal exhaustion, low forceps was applied. Perineal infiltration and pudendal block was the usual mode of analgesia. Methylergometrine was avoided during the third stage. Any atonic postpartum hemorrhage was countered by intramuscular prostaglandin F2 alfa. Antibiotic prophylaxis against infective endocarditis was started at the onset of labor in all the patients by Injection Ampicillin 50 mg / kg body weight in 4 divided doses. Injection Gentamycin 3 mg / kg body weight 8th hourly interval was continued for 24 hours after delivery.

IV. Results
Table1: Demographic variables

Variable	Parameter	Number	Percentage
Age distribution	15-20 years	22	37
	21-25 years	30	50
	26-30 years	6	10
	31-35 years	2	3
Occupation	House wife	50	84
	Labourers	8	13
	Employees	2	3
Education status	Illiterate	21	35
	Primary education	20	33
	Secondary education	15	25
	College	4	7
Parity	Primi	25	42
	Gravida2	19	32
	Gravida 3	11	18
	Gravida 4	4	6
	Gravida 5 and above	1	2

Residence	Rural	36	60
	Urban	15	25
	Urban slum	9	15
Hospital admission	Booked	24	40
	Unbooked	36	60

Table 2: Functional class of cardiac disease based on NYHA classification before and during the present pregnancy

Class	Before pregnancy		During pregnancy	
	No. of cases	Percentage	No. of cases	Percentage
I	27	47	21	35
II	21	36	17	28
III	4	7	7	12
IV	6	10	15	25

Table 3: Rheumatic heart disease - Distribution of dominant valve defects

Valve defects	Number of cases	Percentage
Mitral stenosis + Mitral regurgitation	17	35.41
Mitral stenosis	12	25.00
Mitral stenosis + Aortic stenosis + aortic regurgitation	8	16.66
Mitral stenosis + Aortic stenosis	6	12.50
Mitral regurgitation	2	4.16
Aortic stenosis + Aortic regurgitation	2	4.16
Mitral stenosis + Tricuspid regurgitation	1	2.08

Table 4: Congenital heart disease: - Distribution of cardiac lesions

Cardiac lesion	Number of Cases	Percentage
Atrial septal defect	5	45.45
Patent ductus arteriosus	3	27.27
Venticular septal defect	2	18.18
Primary pulmonary Hypertension	1	9.09

Table 5: Surgically corrected and non corrected cases

Type of disease	Surgically corrected cases		Surgically non corrected cases	
	Number	Percentage	Number	Percentage
Rheumatic heart disease	7	15	41	85
Congenital heart disease	1	9	10	91

Table 6: Associated complications of heart disease

Complications	Number of Cases	Percentage
Atrial fibrillation	4	6.66
Pulmonary edema	2	3.33
Congestive heart failure	15	25.00
Bacterial endocarditis	1	1.66
Pulmonary hypertension	10	16.66

Table7: Method of delivery

S.No	Vaginal delivery	Number of Cases	Percentage
1	Normal labor	32	53.33
2	Forceps	16	26.66
3	Vacuum	2	03.33
4	Assisted Breech	1	01.80
5	Twin delivery	I	01.80
6	Cesarean Section	2	03.33
7	Spontaneous abortion	2	03.33

Table 7: Causative lesion – maternal deaths

Causative lesion	Maternal deaths
MS with AS	1
MS with MR	1
Primary pulmonary Hypertension	1
AS with AR	1

Table 8: Fetal and maternal outcome by NYHA classification

	FC $\leq$ II (n= 38)	Percentage	FC $\geq$ III (n= 22)	Percentage
IUGR	3	7.89	9	40.90
Preterm birth	4	10.5	9	40.90
Maternal mortality	0	0	4	18.1

V. Discussion

Prevalence of heart disease in pregnancy varies from 0.3 to 3.5% in different studies[13]. In the present study the prevalence was 0.43%. Ours being teaching hospital and referral centre, this may not reflect the true prevalence in the population.

Demographics:

Majority of women in the present study belonged to the age group of 21-25 years, had only primary schooling, were primigravidas ,were unbooked and from rural areas. As the most of the antenatal pregnant women have the same demographic profile, the above findings may not be significant.

NYHA classification:

Majority of the women were in functional classes I and II before pregnancy. Ten women showed deterioration in functional class in the present pregnancy.

Aetiology:

In the present study, majority of the women had rheumatic heart disease (80%) followed by congenital heart disease and 2% of miscellaneous causes like Mitral valve prolapse and peripartum cardiomyopathy. These findings are in agreement with other Indian studies[14] .But in developed countries, rheumatic heart disease has decreased due to effective prevention and treatment of streptococcal infections. Rheumatic valvular disease dominates in developing countries comprising 56-89% of all cardiac diseases in pregnancy[11,12]

Lesions :

In the study mitral stenosis was the commonest lesion in the rheumatic heart disease group and atrial septal defect was the commonest among the congenital heart diseases. This was in agreement with the study conducted by Bhatla *et al*[15]. Surgically corrected cases were few in the present study. This may be because of the low socio economic status of the obstetric population attending our hospital.

Associated complications:

Commonest complication was anemia followed by pregnancy induced hypertension. Anemia increases the preload on the heart and worsens the cardiac status. Pregnancy induced hypertension increases the after load on the heart.

Method of delivery:

A total of 32 women were delivered vaginally in the present study. Out of them, 19 were term deliveries and 13 were preterm deliveries. In the present study, the incidence of preterm delivery was 24%. The incidence of preterm delivery is more in maternal heart disease because of cervical softening due to hypoxia. The rate of low forceps delivery was also high (26.6%), when compared to the general population (15%). The high rate of forceps application might be to prevent maternal exhaustion. Cesarean section was done for obstetric indication i.e cephalopelvic disproportion. The rate of cesarean section (3.3%) was similar to the general population and similarly reported in other Indian studies[16] Malhothra *et al.17*also found high rate of preterm delivery, low birth weight, forceps delivery among cardiac patients when compared to non – cardiac patients.

Maternal Outcome: There were four maternal deaths in the present study, accounting for 6.6% mortality. The causes of death were acute pulmonary edema in two cases and congestive heart failure in two cases. All the four were unbooked cases. All of them were in the antenatal period died within few hours of admission, undelivered. In other Indian studies, the mortality rates ranged from 1% to 2.7 % [16,17]. Subbaiah *et al* reported that pregnancy with NYHA class III/IV was associated with high maternal morbidity[18]. They also found a better pregnancy outcome in surgically corrected cases of Rheumatic heart disease when compared to the non corrected cases.

Fetal Outcome: The incidence of Intra Uterine Growth Restriction (IUGR) and preterm fetuses in the present study is more in NYHA class III & IV when compared to NYHA class I & II . Other studies also found adverse fetal outcome in class III & IV.[19]

VI. Conclusions

In the present study, the incidence of pregnancy complicated by heart disease was 0.43 %. Rheumatic heart disease was the commonest aetiological factor, followed by congenital heart disease. Mitral stenosis was the most common lesion among the Rheumatic heart disease group and atrial septal defect among the congenital heart disease group. NYHA classes I and II had better prognosis than class III and IV. Maternal mortality was 6%. We conclude that pregnancy outcome is good in booked cases with regular checkup by obstetrician and cardiologist, surgically corrected cases and those with NYHA class I and II. Hence, joint management by obstetrician, cardiologist, anesthetist and neonatologist will go a long way in ensuring a good prognosis among the pregnant patients with heart disease. In the present study, maximum number of women went into failure in the third trimester, followed by four cases in the puerperium, two patients each in second trimester and during labor. It has been customary to emphasize the time of maximum occurrence of cardiac failure in pregnancy. The above observations show that failure can occur at any time during pregnancy or in the puerperium. Hence, constant vigilance is required throughout antenatal, intrapartum and post partum period.

References

[1]. Uebing A, Steer PJ, Yentis SM, Gatzoulis MA. Pregnancy and congenital heart disease. British Medical Journal .2006;332:401–6.
[2]. Vera Regitz-Zagrosek (Chairperson) (Germany)*, Carina Blomstrom Lundqvist (Sweden), Claudio Borghi (Italy), Renata Cifkova (Czech Republic), Rafael Ferreira (Portugal), Jean-Michel Foidart† (Belgium).ESC Guidelines on the management of cardiovascular diseases during pregnancy. European Heart Journa.l (2011)32, 3147–3197.
[3]. Weiss BM, Von segesser LK, Alon E Outcome of cardiovascular surgery and pregnancy: A systematic review of the period 1984-1996. American Journal of Obstetrics and Gynecology. 1998: 179; 1643-1653.
[4]. Lara A. Friel. Heart disorders in pregnancy. Merck Manual Professional Edition. 2014. online publication
[5]. Khairy P, Ionescu-Ittu R, Mackie AS, Abrahamowicz M, Pilote L, Marelli AJ. Changing mortality in congenital heart disease. J Am Coll Cardiol. 2010 Sep 28;56(14):1149-57.
[6]. Whittemore R, Hobbins JC, Engle MA Pregnancy and its outcome in women with and without surgical treatment of congenital heart disease. American Journal of Cardiology. 1982 Sep;50(3): 641-51.
[7]. Siu SC1, Sermer M, Harrison DA, Grigoriadis E, Liu G, Sorensen S, et al .Risk and predictors for pregnancy-related complications in women with heart disease. Circulation. 1997 Nov4;96(9):2789-94.
[8]. Mosca L, Benjamin EJ, Berra K, Bezanson JL, Dolor RJ, Lloyd-Jones DM et al. Effectiveness-based guidelines for the prevention of cardiovascular disease in women—2011.American Heart Association. Circulation. 2011;123:1243–1262.
[9]. Catherine Nelson-Piercy Cardiac disease Saving Mothers' Lives: Reviewing maternal deaths to make motherhood safer - 2003-2005.117-130
[10]. McFaul P, Dornan J, Lamki H, et al. Pregnancy complicated by maternal heart disease. A review of 519 women. British Journal of Obstetrics Gynaecology. 1998(95):861–867
[11]. Stangl V1, Schad J, Gossing G, Borges A, Baumann G, Stangl K. Maternal heart disease and pregnancy outcome: a single-centre experience. Eur J Heart Fail. 2008 Sep;10(9):855-60.
[12]. Siu SC, Sermer M, Harrison DA etal Risk and predictors for pregnancyrelated complications in women with heart disease. Circulation. 1997; (96): 2789–2794.
[13]. McFaul P, Dornan J, Lamki H, et al. Pregnancy complicated by maternal heart disease. A review of 519 women. British Journal of Obstetric Gynaecology. 1998;(95):861–867
[14]. Konar H, Chaudhuri S. Pregnancy Complicated by Maternal Heart Disease: A Review of 281 Women. Journal of Obstetrics and Gynaecology of India. 2012;62(3):301-306.
[15]. Bhatla N1, Lal S, Behera G, Kriplani A, Mittal S, Agarwal N, Talwar KK Cardiac disease in pregnancy. Int J Gynaecol Obstet. 2003 Aug;82(2):153-9.
[16]. Konar H. Medical disorders in pregnancy—Who should see the woman? Journal of Indian Medical Association. 2004;102:131.
[17]. Malhotra M, Sharma JB, Tripathii R, Arora P and Arora R Maternal and fetal outcome in valvular heart disease. International Journal of Gynecology & Obstetrics.2004; 84(1):11-16.
[18]. Subbaiah M, Sharma V, Kumar S. Heart disease in pregnancy: cardiac and obstetric outcomes. Arch Gynecol Obstet. 2013;(288):23–7.
[19]. Abdel-Hady ES1, El-Shamy M, El-Rifai AA, Goda H, Abdel-Samad A, Moussa S. Maternal and perinatal outcome of pregnancies complicated by cardiac disease.Int J Gynaecol Obstet. 2005 July;90(1):21-5.