



CARDIAC DISEASE IN PREGNANCY

Obstetrics & Gynaecology

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ABSTRACT

INTRODUCTION: In developing countries like India, cardiac diseases complicate 2% of pregnancies and contribute to about one-fifth of all maternal deaths. Heart disease in pregnancy is a high risk condition with increased risk of maternal and foetal morbidity and mortality; hence it mandates a multi disciplinary approach. Audit of misses and near misses helps to determine causes of maternal mortality and morbidity and identify gaps in care.

AIM: To find out incidence of cardiac diseases in pregnancy and to find out maternal and fetal outcome in pregnancy with cardiac disease.

MATERIALS AND METHODS: A retrospective analysis of all pregnant patients with heart disease admitted to department of Obstetrics and Gynecology at Civil Hospital Ahmedabad from January 2020 to January 2021.

RESULTS: Of 6019 deliveries, there were 64 cases of pregnancy with heart disease (1.06%). Majority of patients in study cohort belonged to low socioeconomic status and had rural background. Predominant cardiac lesion was RHD in 42% patients followed by PPCM in 30% patients followed by CHD in 21% patients. 83% babies were full term. 60% patients had vaginal delivery. There were 3 maternal deaths and 7 near misses.

CONCLUSION: The majority of pregnancies complicated by heart disease were uneventful with a favourably good outcome for both the mother and the fetus. Strengthening pre-pregnancy counselling with better health facilities for pregnant women with congenital heart disease is a key component. Early diagnosis, timely referral are crucial components for developing countries. Hence management of such conditions is imperative in times to come.

KEYWORDS

Heart Disease, Pregnancy, RHD, Cardiac Disease

INTRODUCTION

Cardiac disorders complicate approximately 1%–3% of pregnancies and present a real challenge to treating obstetricians and other healthcare providers. Although rheumatic heart disease (RHD) has decreased significantly in developed countries, it is still prevalent in developing countries where it remains an important cause of maternal morbidity and mortality. In India, RHD contributes to approximately 69% of cardiac disorders seen in pregnancy, and most cases present as mixed mitral valve disease. The management of cardiac disease in pregnancy should start with a detailed evaluation, ideally before or at least in early pregnancy. This is important to predict potential complications, which in turn help the clinician to take necessary actions at appropriate time such as avoiding pregnancy at first place, and if pregnancy occurs, then timely termination of pregnancy or need of surgical or therapeutic intervention if required. The CARPREG II score, New York Heart Association (NYHA) Class and modified WHO classification are widely used for categorising patients and manage according to divided protocols. Maternal mortality may be as high as 7% when NYHA Class III and IV patients are combined. In contrast, Class I and II when combined have mortality of only 0.5%. Similarly, fetal mortality may be as high as 30% in Class III and IV patients, in contrast to 2% for Classes I and II. The high maternal morbidity and mortality is due to compromised cardiac function and inability to cope with the physiological adaptations of pregnancy, stress of labor, and hemodynamic changes of the puerperium.

In many instances, lack of financial support and lack of information about the risks of pregnancy in women with heart disease lead to late presentation, and also, social and cultural drawbacks preclude any appropriate preventive strategy. Clinical assessment remains a key factor in timely referral and appropriate management. Audit of misses and near misses (which is surrogate of maternal death is defined as “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth, or within 42 days of termination of pregnancy.”) helps to identify gaps in point of care and improve the quality of service aimed at reduction of maternal morbidity and mortality.

OBJECTIVES: Aim of the study was to find out:

1. Incidence of cardiac diseases in pregnancy
2. Maternal and fetal outcome in pregnancy with cardiac disease.

METHODS

This retrospective analysis was conducted from January 2020 to January 2021 in department of Obstetrics and Gynecology at

B.J. Medical College, Civil Hospital Ahmedabad

Inclusion Criteria

- All pregnant patients with heart disease admitted to department of Obstetrics and Gynecology at Civil Hospital Ahmedabad

Exclusion Criteria

- OPD patients

RESULTS

In present study, we analyzed the data of 6019 deliveries during the study period, of which there were 64 cases of pregnancy with heart disease (1.06%). This study was conducted at our hospital and the obstetric and fetal outcome of 64 patients with heart disease was studied during my residency. In addition to routine antenatal workup, cardiologists decided type and severity of cardiac lesion and also evaluated patient with heart disease.

Age (years)	No of Cases	%
1. 20-30	52	81%
2. 30-40	12	19%
3. >40	-	-
Booking status, n (%)		
1. Booked	21	32%
2. Unbooked	43	68%
Residence, n (%)		
1. Urban	20	31%
2. Rural	44	69%
Socioeconomic status, n (%)		
1. Lower	51	80%
2. Middle	15	20%
3. Upper	-	-
Parity		
1. Primi	22	34%
2. Multigravida	42	66%
Time of Diagnosis of Heart Disease		
1. Prepregnancy	23	36%
2. During pregnancy	31	48%
3. Postpartum	10	16%

Table 1 shows analysis of demographic profile of pregnant patient with heart disease. Data revealed that Majority of patients (81%) were in the

age group of 20 to 30 years. Majority of the patients belonged to low socioeconomic status (80%) and had rural background (69%). Cases of heart disease diagnosed before pregnancy were 36% (n=23), and cases diagnosed during current pregnancy were 48% (n=31) while 16% cases (n=10) were diagnosed postpartum.

Table 2: Etiological distribution

Type of disease	No of cases	%
Rheumatic heart disease	27	42%
Cardiomyopathy	19	30%
Congenital heart disease	14	21%
1. ASD	7	50%
2. VSD	1	7%
3. Eisenmenger's syn.	1	7%
4. Tetralogy of Fallot	3	22%
5. Bicuspid aortic valve	1	7%
6. Ebstein Anomaly	1	7%
Post BMV	3	5%
Prosthetic Valve	3	5%
Arrhythmia	2	3%
MVR	4	6%
TVR	1	2%

Table 2 showing type of heart disease with etiological distribution. RHD still constitutes the major group of heart disease in pregnancy, especially in the developing countries. In present series Table 2 shows RHD consisted 27 out of 64 cases which account for 42%.

Various authors have described the proportion of CHD ranging from 4% to 8%. In this study Table 2 shows that CHD constitutes 21 % of total cases of heart disease may be due to easy availability of diagnostic techniques like 2D-Echo. So, trivial conditions like bicuspid aortic valves and mitral valve prolapse have also been increasingly recognized in minimally symptomatic patients.

Table 3: Relationship of gravidity with heart disease.

Gravidity	RHD	CHD	PPCM	Others	Total
1	12	7	2	1	22
2	10	2	5	2	19
3	3	2	6	1	12
≥4	2	3	4	2	11
Total	27	14	19	4	64

Table 3 shows there were 22 primi gravidae, 19 second gravidae, 12 third gravidae and 11 multigravidae patients. Probably parity has no adverse effect on heart diseases (Pinto Rosurio 1975).

Table 4: Occurrence of severity of heart disease (NYHA grading).

Grade	No. of patients	Percentage
1	38	60%
2	18	28%
3	3	4%
4	5	8%

Table 4 shows most of the patients were in Grade I and II of NYHA classification. With proper care and management normal labor and delivery were achieved in most of these patients. The patients of Grade III and IV were immediately hospitalized because as the grade increases, the maternal and fetal prognosis worsens.

Table 5 :Gestational age at delivery

Gestational age	No of deliveries	%
FT	48	75%
PT	16	25%

Table 5 shows gestational age at delivery. In present study out of 64 patients, 48 (75%) patients had full term deliveries while 16 (25%) patients had pre-term deliveries.

Table 6: Obstetrical Outcome

Onset of Labor	No. of pt	%
1. Spontaneous	59	92%
2. Induced	5	8%
Normal Vaginal delivery	38	60%
Assisted delivery	2	3%
1. Forceps	1	1.5%
2. Vacuum	1	1.5%
Caesarean section	26	40%
1. Elective	7	27%

2. Emergency	19	73%
3. Caesarean for Obstetrical indication	10	38%
4. Caesarean for Cardiac Indication	16	62%
Anesthesia		
1. General Anaesthesia	25	97%
2. Regional Anaesthesia	1	3%

Table 7: Indication of LSCS(n=26)

Malpresentation	4	15%
Fetal Distress	1	4%
Cardiac	16	62%
IUGR	1	4%
Previous LSCS	4	15%
Total	26	100%

Table 6 & 7 depict that the patients with heart disease normally have spontaneous normal vaginal delivery in most of the cases. Out of 64 cases, 38 (60%) cases have normal delivery while 26 (40%) cases have caesarean delivery. 3% cases were of assisted vaginal deliveries. 73% of the caesarean deliveries were of emergency in nature while 27% of the caesarean deliveries were elective. The indications of the caesarean were most of the time due to cardiac indication (62%).

Table 8: Occurrence of various complications.

Complications	RHD	CHD
Congestive cardiac failure	3	1
Pneumonia	-	-
Pleural effusion	1	-
Pulmonary edema	2	-
Thromboembolism	-	-
Maternal mortality	2	1
Hematuria	-	-
Wound gap	-	-

Table 8 shows that total 10 patients developed complications.

Out of 64 cases, 49 cases (76%) were referrals to our tertiary care center.

3 maternal mortalities occurred. One was due to dysfunctional prosthetic mitral valve, other two were due to congestive cardiac failure causing cardiorespiratory arrest. The incidence of maternal mortality from 0.6% to 8% by various authors has been reported. In this study out of 64 cases 03 maternal mortalities reported. Thus, we had case fatality ratio of 4.68%.

Most of the patients who developed complications belonged to NYHA grade 3 to 4 from the very beginning and thus this shows that as the functional grade increases the incidence of cardiac decompensation also increases.

None of patients developed acute rheumatic fever probably due to improved and regular prophylaxis by Inj. Benzathin Penicillin 1.2 MU IM every 21 days which is very effective drug in preventing attacks of rheumatic fever.

The fetal outcome in RHD (especially with corrected valvular pathology) is usually good and only a little different from those in patients who don't have heart disease.

Table 9 :Neonatal outcome

Outcome	No	%
Healthy	43	78%
IUGR	8	14%
LBW	38	69%
NICU admission	12	21%
Neonatal Death	10	18%

As shown in Table 9, 78% of babies were healthy. 69% had low birth weight. Thus, prematurity is very common in patients with heart disease and this in turn leads to babies who are more prone to hypothermia and septicemia.

Table 10: Birthweight spectrum

Weight (kg)	No. of newborn	%
≤2	12	21%
2.1-2.5	26	48%
2.6-3.0	15	27%

>3	2	4%
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In this study as per Table 10 we had 21% of babies who had weight less than ≤ 2 kg and 75% had weight between 2.1 to 3 kg. Thus total 69% babies were of low birth weight in this study. Only 02 babies had birth weight more than 3 kg. This indicates that patients with heart disease normally deliver a baby having birth weight slightly less than that of the other normal pregnant patients.

Table 11: Contraception		
Contraception Method	No. of patients	%
Barrier	28	43%
PPIUCD	25	40%
PER-OP TL	3	4%

In present study in Table 11, 28(43%) cases were advised for barrier contraceptives as they are the safest contraceptives in cardiac patients. In 25 patients with heart diseases, with normal cardiac function and taking regular penicillin prophylaxis, postpartum IUCD CuT 380 A insertion was done with all aseptic precautions and were advised for follow up after 6 weeks and explained all the warning symptoms. 3 per op TL were done while performing cesarean section.

DISCUSSION

In the present study, prevalence of heart disease was found to be 1.06% with RHD being the predominant disease (42%). About 60% patients were in NYHA I at the time of first presentation which is in concordance with the study of Bhatla et al. and Abdel-Hady et al.[1,5]. The mitral valve was the most common valve involved. This was similar to the observations of Sheela et al. and suggests that the incidence of MS in our society has not changed.[2]

Our results are in contrast to developed countries where congenital heart lesions are the dominant cardiac disease in pregnancy. Majority of our patients (81%) were below 30 years of age. In a study by Silversides, the mean age of patients was 32 years[7].

In the present study, majority of the patients (48%) were diagnosed to have heart disease first time during pregnancy. As most patients remain asymptomatic before pregnancy and the underlying condition is unmasked due to hemodynamic changes of pregnancy or when disease itself is severe enough to produce symptoms. A number of deficiencies including lack of antenatal care, late booking, lack of appropriate referral systems to higher level of care, no family planning, overall poor education, and low rates of birth managed by skilled health-care attendants contribute to the high maternal death rates.

In the present study, 68% were unbooked and only 36% of the patients were aware of their heart disease before pregnancy; this reinforces the need of educating prospective parents before the pregnancy and emphasizes the need to screen for heart diseases, so as to reduce the disease burden. 80% of women in our study belonged to low educational status and were unaware about the risks associated with pregnancy.

In cases of heart disease instrumental delivery with forceps or vacuum is preferred, in order to prevent maternal strain and exhaustion. In the present study, 3% had instrumental delivery and 97% delivered without assistance. Patients who delivered without assistance were those who were multiparous, came in advanced labor, and those who progressed rapidly. Epidural analgesia is recommended for all patients undergoing vaginal delivery; it prevents tachycardia and avoids strain on heart. In the present study, not a single patient was given epidural analgesia.

Regional anesthesia, either epidural or spinal, is safe in cardiac patients presenting for C/S. In the present study, epidural anesthesia was safely used in only 1 patient who underwent C/S while others were given GA.

The Japanese Circulation Society joint working group recommended C/S only for patients with cardiac dysfunction, patient at risk of hemodynamic instability, pulmonary HTN, uncontrolled arrhythmia, mechanical valve prosthesis, and patients with cyanosis[8]. In the present study C/S rate is 40%. In the majority (62%), the indications were due to cardiac lesion severity, but in 38% patients, it was purely obstetrical. Our results are in contrast to other studies which have reported C/S rate of 16%–20%. The high rate of C/S in our study is due to the fact that ours is a tertiary care center where we get referred complicated cases with associated comorbidities.

In the present study, 85% patient had live birth, 14% had still birth, and 30% of the term new born were of low birth weight (< 2.5 kg). Small for gestational age babies were seen in 12% of women with cardiac disease as reported by Sawhney et al. [3]. This suggests that cardiac disease itself could be one of the risk factors for low birth weight. In the present study, fetal outcome was good and not different from patient without heart lesion. Good fetal outcome in our study reflects good multidisciplinary care at our institute involving obstetrician, cardiologist, and pediatrician with timely decision for pregnancy termination and good neonatal care facility.

In the present study, the complications relating to cardiac disease resulting in severe morbidity and mortality was seen in 10 patients, the most common being congestive cardiac failure, followed by pulmonary oedema. Three patients with heart failure had severe MS, and three had multivalvular involvement.

Three cases who had prosthetic valve in our study cohort had no complication due to monitored therapy except for one mortality due to dysfunctional prosthetic valve. 2 patients developed cardiac arrhythmia.

In the present study, 11 patients underwent palliative or valve replacement surgery before pregnancy and 3 patients underwent balloon mitral valvuloplasty during second trimester of pregnancy. All of them tolerated pregnancy well. The European task force on the management of cardiovascular diseases in pregnancy also recommends surgical correction of the valve defect before pregnancy[6].

In the present study, near-miss data evaluation shows that there were patient-related avoidable factors in 6 of 7 cases – patients were unbooked, booked late, or did not have regular antenatal visits. Medically related avoidable factors were present in 5 of 8 cases of the near misses. In the present study, audit of miss and near-miss cases identified delays at various levels, delay in diagnosis and treatment due to inadequate history given by patient. This is because many patients and healthcare providers overlook symptom of heart disease as normal pregnancy-related symptom, thus delaying diagnosis and treatment.

There were 3 maternal deaths in the present study. Other studies from resource-poor countries document a low but significant maternal mortality rate. Malhotra et al. reported two deaths in a series of 312 patients[4]; Rahman et al. one death in 229 patients[9], and Sawhney et al. 10 in 480 patients[3]. Our study and analysis of mortality cases as per WHO MDSR format reiterate the need of early hospitalization, evaluation by a multidisciplinary approach, surgical correction before pregnancy, early diagnosis, and proper evaluation.

NYHA Class III and IV strongly predicted an adverse maternal outcome; Sawhney et al. reported a maternal mortality rate of 2% in women with cardiac disease[3]. They studied 486 women over a period of 13 years. Ten deaths were seen, of which 8 women (80%) were in NYHA Class III or IV. In our study also cases who succumbed were in NYHA III and IV. One near miss case was NYHA Class III, despite that she conceived and carried pregnancy till term, this highlights the gap in pre-conceptional counseling and emphasizes need of creating awareness among health care professional regarding absolute indication of MTP as in case with primary pulmonary HTN, Eisenmenger's, pulmonary venoocclusive disease. In the present study factors, associated with adverse maternal outcome were multiparity, young age, severity of valvular lesion, NYHA functional Class III or IV, arrhythmias and poor ejection fraction.

CONCLUSION

In the present study, multidisciplinary consultation was sought in all patients regarding optimal management.

Although the incidence of RHD has decreased, it is still an important cause of maternal morbidity and mortality. Multidisciplinary evaluation with discussion of risk factors, appropriate family planning, and optimizing of the cardiac state before conception are advised.

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Conflicts Of Interest

There are no conflicts of interest.

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