

Cardiac disease in pregnancy – A retrospective study

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Abstract

Objectives: To evaluate the maternal and perinatal outcomes in patients with cardiac disease in pregnancy.

Materials and Methods: Medical records of 185 women with heart disease who delivered at ≥ 28 weeks of gestation from January 2011 to December 2015 at JSS Hospital, Mysuru, were studied.

Results: The prevalence of heart disease in pregnancy was 1.76%. There were 77 (41.6%) women with congenital heart disease and 72 (38.9%) with rheumatic heart disease. 61.6% of the women were from rural background, and 38.4% were from the urban areas. Isolated mitral stenosis was the most common defect in those with rheumatic heart disease; and atrial septal defect was the most common congenital lesion seen. 80% of women remained NYHA class I throughout pregnancy. 53 women who underwent corrective procedures prior to, or during pregnancy had a good outcome. The maternal mortality rate was 1.4%. 44 % of women were primigravidas. The incidence of pre term labor was 15%.

Vaginal delivery was preferred, and the second stage of labor was cut short with either outlet forceps or the vacuum cup. LSCS under regional anesthesia for obstetric indications was well tolerated. 31% of newborns were of low birth weight (<2.5 kg).

Conclusions: Cardiac disease is an important cause of maternal and perinatal morbidity and mortality. Patients with NYHA class I/II had a better maternal and fetal outcome than those with NYHA class III/IV. Surgical correction of the cardiac lesion prior to pregnancy was associated with better pregnancy outcome.

Keywords: Cardiac disease, Pregnancy, Rheumatic heart disease, Congenital heart disease.

Introduction

There have been great advances in the field of cardiology and cardiovascular surgery in the twentieth century. This has led to better survival and improved quality of life in women with cardiac disease. Due to the improvements in hygiene and the implementation of antibiotic therapy, availability of various facilities like cardiac catheterization and the echocardiogram, and innovations in cardiac surgery such as valvuloplasty or replacement and the correction of complex cardiac anomalies, the prevalence of cardiac disease in pregnancy is gradually increasing.^{3,4} At present cardiac disorders complicate approximately 1% to 3% of all pregnancies.⁷ The disease profile, whether it is congenital, rheumatic, or ischemic heart disease, depends on the population seen.⁷ Although rheumatic heart disease is still prevalent in developing countries, where it is responsible for as much as 90% of heart disease in pregnancy, it is now less frequent in developed countries.⁶ In developing countries with a higher prevalence of rheumatic fever it may complicate as many as 5.9% of pregnancies.¹³ In the developed countries however, it is the women who have undergone surgical correction for congenital heart disease are seen in greater numbers. The number of women with congenital heart disease who delivered has increased from 6.4 to 9 per 10000 deliveries from 2000 to 2010.¹⁴ The incidence of ischemic heart disease in pregnancy is reported to be approximately 1 in 10,000.¹⁵ However, with more and more pregnancies occurring in older women, the incidence may increase

in the future. A retrospective analysis of patients with cardiac disease in pregnancy was carried out at JSS Hospital, Mysuru, which is a tertiary care teaching hospital in South India.

The aim of this study was to evaluate women with heart disease complicating pregnancy, and identify (1) the etiology of heart disease complicating pregnancy; (2) antepartum, intrapartum and postpartum course of these women; and (3) the perinatal outcome.

Materials and Methods

The medical records of pregnant women who were admitted to JSS hospital, Mysuru, from January 2011 to December 2015 were retrieved from the Medical records department. 185 women were identified as having a cardiac disorder complicating pregnancy. These women were managed in the cardio obstetric clinic, under the care of an obstetrician and a cardiologist. They underwent thorough clinical examination, ECG and echocardiography.

The demographic parameters of these women, such as the age, parity, socioeconomic status and occupation were noted. Their clinical history, such as NYHA class at booking, gestational age at first visit, history of cardiac complications before pregnancy, cardiac medications and anticoagulation, prior history of cardiac surgery/interventions and nature of the cardiac lesion was recorded. The details of the antenatal period, labor and delivery, postnatal course and complications were retrieved. The immediate perinatal outcome was also documented. Statistical analysis was done using

the SPSS software.

Results

The total number of women who delivered at our institution between January 2011 and December 2015 were 10,487. Of these 185 were diagnosed with cardiac disorders, giving a prevalence rate of 1.76%. There were 77 (41.6%) women with congenital heart disease, 72 (38.9%) with rheumatic heart disease, 23 (12.4%) with Mitral valve prolapse, 2 (1.1%) with ascending aortic aneurysm, 3 (1.6%) with arrhythmias, 3 (1.6%) with peripartum cardiomyopathy, 2 (1.1%) with viral myocarditis, and 3 (1.6%) who had a prior history of coronary artery disease.

The age of our patients ranged from 18 to 38 years, with the mean age being 24.1 years. 61.6% of the women were from rural areas, and 38.4% belonged to the urban locality. It was interesting to note that 67% of the women with rheumatic heart disease came from rural areas, whereas in patients with congenital heart disease only 55% belonged to the rural areas.

65% of the women belonged to the lower middle class and 31% to the upper middle class. Among women with rheumatic heart disease 70% were from the lower middle class as compared to 64% of women with congenital heart disease.

29% of women were diagnosed with heart disease during pregnancy. The diagnosis was made either during routine clinical examination, or suspicion due to symptoms such as shortness of breath, pedal edema. 4% of women were diagnosed with heart disease when they suddenly developed congestive cardiac failure.

However, at the other end of the spectrum were women who were well compensated, and on treatment for more than 20 years. 23% of patients were diagnosed with cardiac disorders more than 10 years ago, and were well compensated despite the long duration of heart disease.

86% of women were NYHA class I when they entered pregnancy, and 80% remained so throughout pregnancy. 6% had a worsening of NYHA status due to various causes, pregnancy itself being a major precipitating factor. 3% of women were NYHA class III/IV at the time of referral to our hospital in the third trimester.

151 women required prophylaxis against spontaneous bacterial endocarditis. 9% of women were on anticoagulants and 5% on anti failure medications.

Table 1 shows the various conservative and surgical procedures which the patients underwent prior to or during pregnancy. All 53 patients tolerated pregnancy well.

Table 1: Corrective Procedures done

Procedure done	No.
PTCA	1
PCI	2
RF ABLATION	2
Balloon valvuloplasty	5
Mitral valve replacement	3
Mitral valve repair	1
ASD Closure	24
Vsd closure	0
PDA device closure	6
Both ASD and PDA closure	1
Balloon valvuloplasty pulmonary	4
Balloon valvuloplasty aortic	1
Fonton's repair	1
Rerouting of PAPVC with pericardial buffering	2

The maternal and perinatal outcomes are discussed below. 48% of the women were primigravidas, and 22% had pregnancy of 3rd or higher order. 81% delivered at term. The incidence of pre term labour was quite high at 15%. 51% went into spontaneous labour, 17% required induction of labour, for various indications as term pregnancy, PPRM, and intra uterine fetal demise. 44% of the patients underwent a full term normal vaginal delivery requiring minimal assistance apart from episiotomy. 9% of the women required shortening of the second stage of labor. Both outlet forceps and the vacuum cup were used with good results. However, outlet forceps were preferred to ventouse, as it decreases the maternal bearing down efforts. The rate of preterm vaginal delivery was 8%. The rate of LSCS was very high at 32%. The indications for LSCS were due to obstetric reasons, the most common being previous LSCS (8%) and malpresentation (5%). There were no cardiac indications for LSCS, such as Coarctation of aorta or aortic aneurysm. Sub arachnoid block was given in majority of patients (96%). General anesthesia was used only in two patients. Various obstetric and medical comorbidities were observed as listed in table 2.

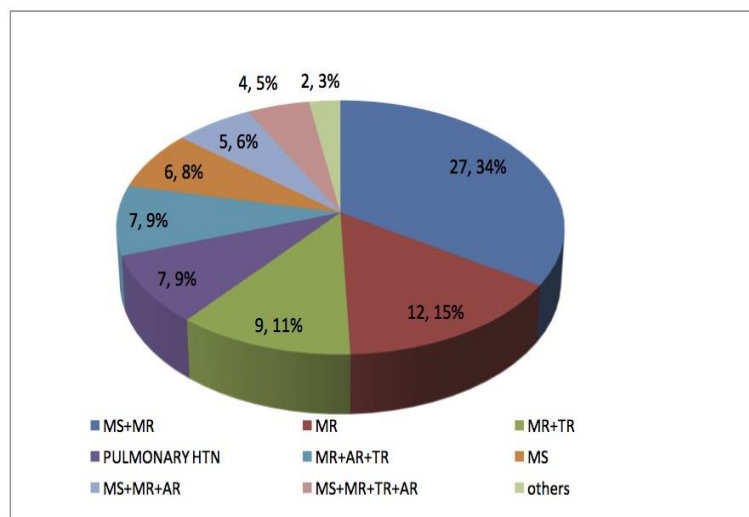
Table 2: Obstetric and Medical Co morbidities

Obstetric and medical comorbidity	No.
Pre Eclampsia	5
Eclampsia	1
Gest HTN	2
Hypothyroid	2
Anemia	6
GDM	5
Inevitable abortion	1
PPROM	1
Threatened preterm labor	2
Pre term labor	27

The immediate neonatal outcome was documented. There were 181 live births. 56% of newborns had a birth weight ranging from 2.5 to 3.5 kg, which is considered appropriate for gestational age in a term neonate. However, a large number, 31% of term babies had low birth weight, (<2.5 kg), and after excluding other factors, it was concluded that cardiac disease itself was a risk factor for low birth weight. 12% of women developed complications within 48 hours of termination of pregnancy. Although the maternal mortality was low, (1.4%), near miss events were high in the patients who required intensive care and ventilator support. It was observed that patients who were NYHA class III or IV, or those with peripartum cardiomyopathy required intensive care facilities more often.

Table 3: Postpartum complications

Postpartum complication	No.
ICU care	14
Ventilator	3
Mortality	3
Blood transfusion (severe anemia)	1
TIA	2

**Fig. 1: Prevalence of Rheumatic heart disease**

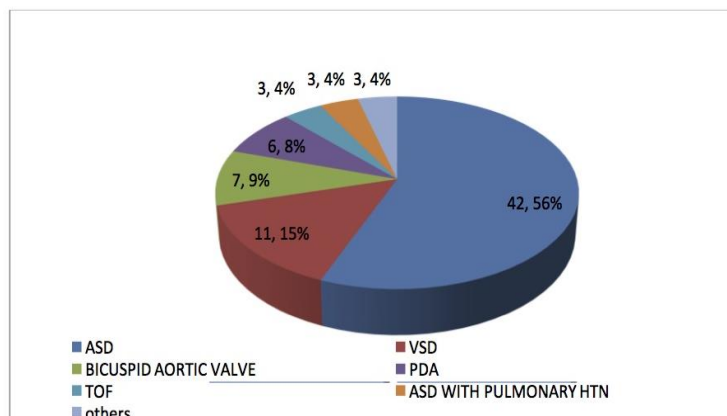


Fig. 2: Prevalence of congenital heart disease

Discussion

Cardiac disease is a major complicating factor in pregnancy. Rheumatic heart disease continues to be a major problem in the developing world, whereas in the developed countries, congenital heart problems are more often encountered during pregnancy. In our study, the prevalence of heart disease in pregnancy was 1.72%; of which 38.9% women were diagnosed with rheumatic heart disease and 41.6% with congenital heart disease. The ratio of rheumatic to congenital heart disease was 0.93:1. Various earlier studies in India have reported ratios ranging from 3.2:1¹⁶ to 8.3:1.¹⁷ Our study depicts a decrease in the incidence of rheumatic heart disease complicating pregnancy, which is the result of improved awareness and access to healthcare.

In patients with rheumatic heart disease, the mitral valve was the most commonly involved. Isolated mitral valve lesions; both stenosis and regurgitation were seen

in 57% of our subjects. This was similar to the observations of Sheela et al.⁵ Among patients with congenital heart disease, septal defects were the most common. Atrial septal defect was seen in 56% of the women with congenital heart lesions. However, complications like shunt reversal and pulmonary hypertension were not commonly seen. The outcome of pregnancy was determined by the maternal functional status in the first trimester of pregnancy. NYHA class III and IV strongly predicted an adverse maternal outcome. There were 3 maternal deaths (1.4%) encountered in our study. Peripartum dilated cardiomyopathy accounted for 2 deaths, and NYHA IV status, not responding to treatment was the cause of death in one patient. Postpartum ICU admissions were needed in 14 women who had a poor functional status. Sawhney et al reported a maternal mortality rate of 2% in women with cardiac disease. They studied 486 women over a period of 13 years. Ten deaths were seen, of which 8 women (80%) were NYHA class III or IV.⁶

29% of our patients underwent corrective procedures, either surgical or minimally invasive, prior to or during pregnancy. The most common procedure

was patch closure of Atrial Septal defect. 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 in rheumatic heart disease prior to pregnancy.¹⁶ However, the longer the interval between valvotomy and pregnancy, the higher was the chance of cardiac failure. In developed countries, most patients with congenital heart disease undergo surgical correction in childhood. However, in developing countries, a significant number of patients are diagnosed with congenital heart disease for the first time during pregnancy. These women require careful conservative management, followed by surgery 8 -12 weeks post delivery. Several studies have shown that conservative cardiac surgery was safe in pregnancy, especially in the second and early third trimester. The most commonly done surgery during pregnancy has been percutaneous balloon commissurotomy.⁹⁻¹¹

An adverse cardiac event was most likely to occur during labor and in the immediate post partum period. The most common cardiac complications are congestive heart failure and arrhythmias.^{20,21}

They usually respond well to medical therapy. Advanced NYHA functional class and prior history of heart failure are the most important risk factors for an adverse cardiac event.⁴ Hence delivery was best carried out at a tertiary center with intensive care facilities and under the joint supervision of an obstetrician and cardiologist.¹²

Antibiotic prophylaxis against infective endocarditis was recommended in patients with moderate to severe valve lesions, and in those with significant shunts.⁸ In patients who underwent vaginal delivery, instrumental delivery with ventouse or outlet forceps was preferred, in order to prevent maternal strain and exhaustion. In our study, the rate of instrumental delivery was 9%, as majority of the patients had a short second stage of labor, and delivered without assistance. Epidural analgesia was recommended for all patients undergoing vaginal delivery, as it prevented tachycardia without significant hemodynamic changes. This avoided the sudden rise in

left atrial pressure.¹⁷ Cesarean section for obstetric indications was done in 32% of patients in our study with good outcomes. Various other studies have reported an incidence of 16 – 20%.¹³ The JCS joint working group recommended cesarean section only for patients with cardiac dysfunction, patient at risk of hemodynamic instability, pulmonary hypertension, uncontrolled arrhythmia, mechanical valve prosthesis, and patients with cyanosis.¹⁴

Regional anesthesia, either epidural or spinal was safe in cardiac patients presenting for caesarean section. Spinal anesthesia was safely used in 96% of patients who underwent LSCS. Other studies have reported caesarean sections with cardiac disease under spinal anesthesia with a success rate of 99%.¹⁸

56% of babies in our study had a birth weight ranging from 2.5 – 3.5 kg, which is considered appropriate for the term neonate. However almost 31% of the term new born were of low birth weight (<2.5kg). A similar finding was reported by Soma Pillay et al.¹⁹ Small for gestational age babies were seen in 18.2% of women with cardiac disease as reported by Sawhey et al in 2003.⁶ This led to the inference that heart disease itself could be one of the risk factors for low birth weight.

So, it is important to educate patients and create awareness that surgical correction of the cardiac condition, and optimization of cardiac status prior to pregnancy will help to achieve a good maternal and perinatal outcome.

Conclusion

Major cardiovascular changes are seen during pregnancy, labor, and delivery and the postpartum period. It is essential to distinguish physiological changes of pregnancy from those of a worsening cardiac condition. It is important for the physician to be familiar with the treatment of commonly encountered cardiac diseases during pregnancy. A multidisciplinary approach with obstetric care at a center equipped to handle high risk patients, specialized cardiology assessment and follow-up, and genetic counseling is recommended for women with heart disease in pregnancy.

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