

Maternal and perinatal outcomes of pregnancies complicated by cardiac disease

Kardiak hastalıkla komplike olmuş gebeliklerin maternal ve perinatal sonuçları

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Abstract

Objective: To evaluate the maternal and fetal outcomes of pregnancies, complicated by cardiac disease in a developing country.

Material and Method: A retrospective analysis was carried out in 110 pregnancies in women with cardiac disease from January 1995 to December 2006 at a tertiary care centre in India.

Results: Rheumatic heart disease with isolated mitral stenosis (n=49) was the predominant cardiac problem. 9 Patients (8.18%) had undergone surgical correction prior to pregnancy. Cardiac complications were noted in 20 (18.18%) patients, out of which 12 had pulmonary oedema. Maternal mortality was noted in 4 patients (3.6%), 3 of which were due to pulmonary oedema. The incidence of small for gestational age was noted in 48 (46.3%) patients, still birth was noted in seven (6.8%) babies and neonatal death was noted in three patients (2.9%).

Conclusions: Rheumatic heart disease was the predominant cardiac problem in pregnancy. Maternal and perinatal morbidity and mortality are strongly correlated with maternal cardiac functional classification. (J Turkish-German Gynecol Assoc 2009; 10: 30-4)

Key words: Pregnancy, cardiac disease, rheumatic heart disease

Özet

Amaç: Gelişmekte olan ülkelerde kardiak hastalık ile komplike olmuş gebeliklerin maternal ve fetal sonuçlarını değerlendirmek.

Gereç ve Yöntemler: Hindistandaki 3. basamak sağlık hizmeti veren bir merkezin Ocak 1995-Aralık 2006 tarihleri arasında kardiak hastalıklı 110 gebe kadın üzerinde retrospektif analiz uygulanıldı.

Bulgular: İzole mitral darlıklı romatizmal kalp hastalığına sahip 49 kişide (n=49) predominant kardiak problem saptandı. 9 hasta (8.18%) gebelik öncesi cerrahi düzeltme operasyonu geçirmişti. Kardiak komplikasyon görülen 20 hastanın (18.18%) 12'sinde pulmoner ödem saptandı. 4 hastada maternal mortalite görüldü, bunların 3'ü pulmoner ödem kaynaklı idi. 48 hastada (46.3%) SGA indisansı saptandı, 7 bebek (6.8%) yaşamına devam ederken 3 hastanın (2.9%) neonatal dönemde öldüğü görüldü.

Sonuç: Gebelikte romatizmal kalp hastalığı predominant kardiak problemidir. Maternal ve perinatal morbidite ve mortalite ile maternal kardiak fonksiyonel sınıflandırma arasında güçlü bir korelasyon/ilişki vardır.

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Anahtar kelimeler: Gebelik, kardiak hastalık, romatizmal kalp hastalığı

Introduction

Heart disease complicates approximately 1% of all pregnancies (1-6). Cardiovascular abnormalities are considered the first non-obstetric cause of morbidity and mortality during pregnancy. Rheumatic and congenital heart diseases are currently the most frequent cardiopathy found in women of childbearing age (7). Heart disease is now second only to suicide as the leading cause of maternal mortality (4). The prevalence of pregnancy complicated by rheumatic heart disease (RHD) has decreased in developed countries (1,8). Former ratio of 3:1 for RHD to congenital heart disease (CHD) in patients with cardiac disease complicating pregnancy is now essentially reversed. In developing countries rheumatic heart disease is still predominant and continues to be a major cause of maternal morbidity and mortality (1,9).

In our institution, RHD is still responsible for the majority of cases of heart disease in pregnancy. The majority of women with cardiac disease can tolerate pregnancy successfully without major complications (1,3,7,10). However, in some of the patients, pregnancy can cause certain therapeutic problems, which may threaten maternal and fetal well being and survival. In the presence of maternal heart disease, the circulatory changes of pregnancy may result in adverse consequences, including death of the mother or fetus (11). Pregnancy is a challenge to women with heart disease because of the 50% increase in plasma volume and six-fold increase in the risk of thrombosis (4). In developing countries, quite a large number of women become pregnant without seeking therapeutic intervention for cardiac lesions and many of them are only diagnosed with heart disease during pregnancy (1). The keys to successful diagnosis and management of incipient disease

se are: a high index of suspicion, particularly in women with known risk factors for cardiovascular disease; a low threshold for radiological investigations; early cardiology input; and invasive monitoring during labour and delivery (12). Management of pregnant women with pre-existing cardiac problems should be undertaken by multidisciplinary teams in tertiary centers (12). In women with pre-existing cardiac disease wishing to proceed to term, cardiac status must be optimized preoperatively and preferably a planned elective delivery should be scheduled (12). The present study was undertaken to study the current maternal and fetal outcome in patients with heart disease.

Materials and Methods

The study was conducted at Government Lady Goschen Hospital and Kasturba Medical College, Mangalore from January 1995 to December 2006. During this time, the total number of deliveries was 35,242. There were 536 deliveries in patients with heart disease. We analysed 110 pregnancies where details of antenatal events and deliveries were available.

The following baseline data were recorded in all patients: maternal age, parity status, gestational age, and nature of the underlying cardiac lesion, New York Heart Association (NYHA) functional class, and presence of hypertension, cardiac intervention prior to pregnancy, cardiac medication and anticoagulants.

Laboratory analysis included blood grouping, blood counts, urine analysis, serum biochemistry and VDRL, HIV and HBs Ag. Electrocardiography (ECG) and echocardiography were done for all women suspected to have heart disease. An obstetrician and a cardiologist examined the registered antenatal patients every two weeks up to 28 weeks, then weekly until delivery. All the patients in the study could not be examined from first trimester as many patients were referred to our institute at full term pregnancy or in labor. Apart from obstetric indications; women were hospitalized if they had overt symptoms or signs suggestive of worsening cardiac status. Admission was advised if women were in NYHA class III/IV irrespective of the period of gestation and at 37 weeks gestation irrespective of class.

All the women (with RHD) received antibiotic prophylaxis (Benzathine penicillin 1.2 million units intramuscular after test dose) every 3 weeks. Pregnancy was allowed to continue till term in uncomplicated patients and induction of labour was done only for obstetric indications. Option of termination of pregnancy was given to complicated patients. All the women (with RHD) received standard peripartum infective endocarditis prophylaxis (ampicillin & gentamycin injections).

Labor induction was only for obstetric indications. Patients were kept in propped up position, intermittent oxygen and analgesics were provided. The second stage was shortened if necessary, by the use of outlet forceps or ventouse extraction. Oxytocin was used for control of post partum haemorrhage. Adverse outcomes during the antepartum, peripartum and postpartum period were classified as: Maternal (obstetric), Cardiac and perinatal complications.

Maternal complications were: Anemia (Hemoglobin <10g/dL), pregnancy induced hypertension (defined as systolic blood pressure >140 mmHg or diastolic blood pressure >90 mmHg), Postpartum hemorrhage (defined as blood loss >500 mL after vaginal delivery or >1000 mL after caesarean section).

Cardiac complications were defined as pulmonary edema (documented by chest radiograph or by crackles heard over at least one third of posterior lung fields), sustained symptomatic tachyarrhythmia requiring treatment, cardiac arrest or cardiac death.

Perinatal complications were defined as: Preterm birth (<37 wks gestation) small for gestational age, still birth, intrauterine demise.

Maternal outcome (deterioration of NYHA class, maternal morbidity and mortality) and perinatal outcome (birth weight, preterm, Apgar score, admission to NICU) were documented for each patient.

Results

Majority of patients had rheumatic heart disease out of which 49 patients (44.5%) had mitral stenosis (MS). Twenty-three patients (20.9%) had mitral regurgitation (MR), 15 patients (13.6%) had MS with MR. Four patients (3.6%) had aortic stenosis (AS) and 11 patients (10%) had aortic regurgitation (AR). Sixteen patients had congenital heart disease, out of which 8 patients (50%) had atrial septal defect (ASD) and one patient had Eisenmenger's syndrome with ASD (Table 1).

The majority of patients 58 (52.72%) were primigravidas. Seventy five patients (68.2%) had single valve involvement and the 49 of them had mitral stenosis. Nine patients (8.18%) had surgical correction prior to pregnancy (i.e. closed mitral valvulotomy). Mean maternal age was 26.45±2.19 years. Ninety-four patients were in NYHA class I – II (85.45%) and 15 patients (13.6%) were in NYHA class III – IV (Table 2).

Maternal Complications

Maternal complications included anaemia in 10 patients (9.1%) pregnancy induced hypertension in 7 patients (6.4%). One patient had post partum haemorrhage (0.9%).

Cardiac complications were observed in 20 patients (18.2%); 12 patients (10.9%) had pulmonary oedema, 3 patients (2.7%) had atrial fibrillation and 5 patients (4.5%) had infective endocarditis. There were 4 maternal deaths (3.6%) and all of them occurred in patients with NYHA class III and IV (Table 3).

Table 1. Prevalence of cardiac disease in pregnancy

| I | Rheumatic heart disease | Number (%) |
|-----|--|------------|
| 1. | Mitral stenosis | 49 (44.5%) |
| 2. | Mitral regurgitation | 23 (20.9%) |
| 3. | Mitral stenosis + mitral regurgitation | 15 (13.6%) |
| 4. | Aortic stenosis | 4 (3.6%) |
| 5. | Aortic regurgitation | 11 (10%) |
| II. | Congenital heart disease | Number (%) |
| 1. | Atrial septal defect | 8 (7.3%) |
| 2. | Ventricular septal defect | 6 (5.5%) |
| 3. | Patent ductus arteriosus | 1 (0.9%) |
| 4. | Eisenmenger's syndrome | 1 (0.9%) |

Table 2. Cardiac status and maternal characteristics

| | Maternal characteristics | Number (%) |
|----|--|-------------|
| 1. | Maternal age (years) | 26.45±2.83 |
| 2. | Primigravida | 58 (52.72%) |
| 3. | Multigravida | 52 (47.27%) |
| 4. | Single valve | 75 (68.2%) |
| 5. | Multiple valves | 21 (19.1%) |
| 6. | Surgical correction (prior to pregnancy) | 9 (8.18%) |
| 7. | NYHA classification | |
| | I | 78 (70.9%) |
| | II | 16 (14.55%) |
| | III | 11 (10%) |
| | IV | 4 (3.64%) |

Table 3. Maternal complications

| | Maternal complications | Number (%) |
|-----|------------------------|-------------|
| I | Non cardiac | |
| | Anaemia | 10 (9.1%) |
| | PIH | 7 (6.4%) |
| | Abruptio placentae | 2 (1.8%) |
| | PPH | 1 (0.9%) |
| | Wound infection | 2 (1.8%) |
| II | Cardiac | 20 (18.18%) |
| | Pulmonary oedema | 12 (10.9%) |
| | Atrial fibrillation | 3 (2.7%) |
| | Bacterial endocarditis | 5 (4.5%) |
| III | Maternal death | 4 (3.6%) |

Perinatal Outcomes

Overall, the mean gestational age at the time of delivery was 37.22±5.164 weeks. Ninety patients (87.4%) went into spontaneous labour. Labour was induced in 7 patients (6.8%) with oxytocin. Eighty patients (72.8%) had vaginal delivery, out of which 6 babies were delivered by ventouse and 10 babies were delivered by outlet forceps (Table 4).

Caesarean section was done in 30 patients (29.1%), main indications being previous caesarean section and fetal distress. Mean birth weight was 2.54±0.609 kg. Forty-eight (46.3%) babies were small for gestational age and intrauterine death occurred in 7(6.8%) babies. Majority of babies had an Apgar score of 9/10 at 5 minutes. Twenty-two babies (21.4%) had Apgar score less than 9/10 at 5 minutes. Thirty-one babies (30.1%) were admitted to Neonatal intensive care unit (NICU) and 3 babies (2.9%) died during neonatal period.

Discussion

Cardiac disease continues to be a risk factor for maternal and neonatal morbidity and mortality. This study reflects the mater-

nal and fetal outcome in pregnant women with cardiac disease managed at a government hospital, which is also a tertiary care referral centre in India. Many patients were diagnosed for the first time during pregnancy and sought treatment when hemodynamic compromise had already begun.

Most of our patients had RHD which was also found to be the major form of heart disease in other studies (9,13,14,15). Mitral stenosis was the commonest lesion (44.6%) which was similar to observation of different authors (1,2,13,14). Only 9 (8.18%) patients had undergone closed mitral valvulotomy. None of other patients had undergone any surgical correction. Various authors have described different surgical corrections of the heart lesions before as well as during pregnancy (1,9,13,14,16). We attribute lack of awareness about heart disease and poor socio-economic status in our patients for less number of corrective surgeries in our series.

Primigravida (52.72%) accounted for the major group. Single valve involvement was seen in 68.2% patients. Mitral valve area and left ventricular ejection fraction were obtained from latest echocardiography report of each patient. But this was not possible in all cases as some patients were referred in active labor and repeat echocardiography could not be performed. Hence earlier available echocardiography report had to be resorted for documenting the details of cardiac lesion.

Congenital heart disease accounted for 16 (14.54%) patients among which 7.3% patients were diagnosed to have atrial septal defect. None of these patients had any history of surgery done for correcting the cardiac anomaly. Many authors found congenital heart disease to be the major form of heart disease in pregnancy (17).

Majority of our patients were in NYHA class I and II (85.46%). Though patients with NYHA class III and IV were less in num-

Table 4. Perinatal outcomes

| | |
|--|--------------|
| Gestational age (weeks) | 37.22 ±5.164 |
| Spontaneous labour | 90 (87.4%) |
| Induced labour | 7 (6.8%) |
| Vaginal delivery | 80 (72.8%) |
| Caesarean section | 30 (27.2%) |
| Birth weight (kg) | |
| Mean | 2.54±0.609 |
| <2kg | 17 |
| 2-2.5kg | 31 |
| 2.5-3kg | 40 |
| >3kg | 15 |
| Small for gestational age | 48 (46.3%) |
| Still birth / intrauterine fetal death | 7 (6.8%) |
| Congenital heart disease of baby | 0 |
| Apgar at 5min | |
| 9/10 | 81 (77.6%) |
| < 9/10 | 22 (21.4%) |
| Admitted to NICU | 31 (30.1%) |
| Neonatal death | 3 (2.9%) |

ber, they had the worst maternal and perinatal outcomes. These findings correlate with observation done by various authors (1,2,13,14).

Most of women (87.4%) in our study went in to spontaneous labor. Among them the majority delivered vaginally (72.8%) and caesarean section (27.2%) was done for obstetric indications only. These observations were comparable to various authors 1. Six babies were delivered by ventouse and 10 babies delivered by outlet forceps to cut short second stage of labor and avoid fetal distress. Use of instrumental vaginal delivery to cut short second stage of labor is advocated by various authorities in the past (4,5,6).

Cardiac problems during pregnancy in our study were pulmonary edema (10.9%), atrial fibrillation (2.7%) and bacterial endocarditis (4.5%). These complications are reported by many authors (1,8,9,14,15,17) in the past. In our series there were 4 (3.6%) maternal deaths which was comparable to other studies (1,2,13,15). These patients belonged to NYHA III and IV category which was similar to various articles (1,14,18,19) who found increased rates of mortality and morbidity in these classes of patients. H.Sawhney et al 1 reported 2% maternal mortality due to rheumatic heart disease, which were due to pulmonary edema in the majority of cases. In our series maternal mortality was due to pulmonary oedema occurred in 3 cases. These patients had moderate to severe mitral stenosis and were in NYHA III and IV category. One case of maternal mortality was after an emergency caesarean section done for obstetric indication. This patient had severe mitral stenosis, went in to cardiac arrest and did not recover from general anaesthesia. All the patients with maternal mortality had rheumatic heart disease. Maternal mortality rates were lower 15 and higher 20 in various studies than our study.

There was one patient with Eisenmenger's syndrome who delivered a still born baby at full term pregnancy. She had atrial septal defect with pulmonary hypertension. She was referred for surgical correction after delivery. Maternal mortality rate is known to be increased in patients with Eisenmenger's syndrome (8,16).

Additional antibiotics to prevent endocarditis during uncomplicated labor are given by many obstetricians; however, they are not recommended by the American college of cardiology/American heart association (ACC/AHA) (8). In our centre, antibiotic prophylaxis against infective endocarditis during delivery is routinely given in all patients with rheumatic heart disease. The report on confidential enquiries in to maternal deaths in England and Wales (department of health and social security 1998) shows that there were 11 deaths from endocarditis in the United Kingdom between 1996 and 1998: 11% of all cardiac deaths. We encountered bacterial endocarditis in 5 (4.5%) patients despite prophylaxis. We had no mortality due to bacterial endocarditis. McFaul et al (22) gave antibiotic prophylaxis during labour in 3% of pregnancies

Maternal heart disease was associated with an increased risk of neonatal complications (11,23). An increased incidence of low birth weight has have been reported in patients with cardiac disease in pregnancy (11,14,24,25). The reasons include hemodynamic compromise, placental insufficiency and cardio active drugs such as diuretics, digitalis and beta blockers. In our series mean birth weight was 2.54 kilograms and 48 (46.3%) babies were small for gestational age. Seven (6.8%) babies were

stillborn and thirty-one (30.1%) babies required Neonatal intensive care unit admission. W.Drenthen et al 16 reported overall offspring mortality rate of 4%. Perinatal mortality rate varied in every study (2).

In conclusion, RHD is the commonest cardiac lesion among pregnant women. Fetomaternal morbidity and mortality are high in patients with NYHA class III and IV. There is less awareness among people regarding cardiac problems and its complications in pregnancy which needs to be improved.

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