

PREGNANCY OUTCOMES OF 115 CASES WITH MATERNAL HEART DISEASE

MATERNAL KALP HASTALIĞI OLAN 115 GEBELİK OLGUSUNUN SONUÇLARI

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ABSTRACT

Objective: To evaluate the outcomes of pregnancies with maternal heart disease.

Material and Method: The results of 115 patients in our clinic between 2013 and 2018 were retrospectively analyzed. The type of heart disease and functional classification of the New York Heart Association were taken into consideration when evaluating the cases.

Results: According to the New York Heart Association classification, the distribution of patients was 67.1% for stage I, 18.2% for stage II, and 14.7% for stage III-IV. There was no maternal or perinatal mortality. The incidence of rheumatic and congenital heart diseases was 51.3% and 27.8%, respectively. Maternal morbidity was observed in 18 cases (15.6%). Mean gestational age and birth weight were significantly higher in the stage I-II functional capacity group ($p<0.001$). Maternal morbidity and admission rates to neonatal intensive care unit were significantly higher in the stage III-IV functional capacity group ($p<0.001$). There was no significant difference between stage I-II and stage III-IV groups in terms of cesarean delivery rates and fetal growth restriction ($p>0.05$).

Conclusion: It is possible to obtain satisfactory results for both mother and fetus in the majority of pregnant women with heart disease when managed with a multidisciplinary approach.

Keywords: Heart disease, pregnancy, outcome

ÖZET

Amaç: Maternal kalp hastalığı bulunan gebeliklerin sonuçlarını değerlendirmek.

Gereç ve Yöntem: 2013-2018 yılları arasında bir kliniğimizdeki 115 maternal kalp hastalığı olan olgunun sonuçları retrospektif olarak incelenmiştir. Olgular değerlendirilirken kalp hastalıklarının türü ve New York Kalp Derneği'nin fonksiyonel sınıflaması göz önünde bulundurulmuştur.

Bulgular: New York Kalp Derneği sınıflamasına göre hastaların dağılımı evre I için %67,1, evre II için %18,2, evre III-IV için ise %14,7 idi. Maternal ya da perinatal mortalite saptanmadı. Romatizmal ve konjenital kalp hastalıklarının görülme oranı sırasıyla %51,3 ve %27,8 olarak bulundu. Maternal morbidite 18 olguda (%15,6) gözlemlendi. Ortalama doğum haftası ve doğum kilosu evre I-II fonksiyonel kapasiteli grupta belirgin yüksekti ($p<0,001$). Maternal morbidite ve yenidoğan yoğun bakım ünitesine kabul oranları ise evre III-IV fonksiyonel kapasiteli grupta belirgin yüksekti ($p<0,001$). Evre I-II ve evre III-IV grupları arasında sezeryan ile doğum oranları ve fetal gelişim kısıtlılığı görülme sıklığı açısından anlamlı fark saptanmadı ($p>0,05$).

Sonuç: Multidisipliner bir yaklaşımla yönetildiğinde kalp hastalığı bulunan gebelerin çoğunluğunda hem anne hem fetüs için memnun edici sonuçların alınması mümkündür.

Anahtar Kelimeler: Kalp hastalığı, gebelik, takip

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INTRODUCTION

Heart disease is a leading cause of maternal mortality, especially in the developed countries (1). The etiology of heart disease during pregnancy is valvular heart disease, congenital heart disease, cardiomyopathies and arrhythmias. Recently, the prevalence of maternal congenital and acquired heart diseases has increased during pregnancy (2-5). Maternal heart disease during labor and delivery is prone to adverse events in pregnant women and their offspring (6).

Pregnancy associated hemodynamic changes, such as increased circulating blood volume, decreased peripheral vascular resistance and, particularly increased cardiac out-put during labor, increase the maternal risk of adverse cardiovascular events (2,7). The risk of mortality and morbidity of adverse cardiovascular events depends on the type of disease with functional cardiac status of the pregnant woman (8).

In this study, we retrospectively analyzed the maternal, obstetric, and neonatal outcomes of pregnant women with various forms of heart disease admitted for delivery in our tertiary care center.

MATERIAL AND METHOD

In our clinic, hospital records of 115 pregnant women with complicated heart disease between 2013 and 2018 were analyzed retrospectively. The study was conducted in accordance with the principles outlined in the Helsinki Declaration in 2008.

Medical and antenatal data of both pregnant women and newborns were evaluated. Cardiac status of pregnant women was defined according to the New York Heart Association (NYHA) functional classification (9). Maternal age, parity, nature of the cardiac disorder, NYHA functional class and, cardiac intervention prior to pregnancy were recorded at the first antenatal visit. Pregnant patients were monitored by a team of obstetricians and cardiologists in cooperation during pregnancy. Patients with congenital heart disease (CHD) were referred to fetal echocardiographic examination. The clinicians determined the route of delivery according to the cardiac functional capacity and the obstetric indication. Antibiotic prophylaxis was applied to all patients during labor to prevent infective endocarditis. The gestational age at birth, occurrence of obstetric complications, delivery route and postnatal complications were evaluated. Perinatal outcomes such as stillbirth (intrauterine death ≥ 20 weeks gestation), fetal growth restriction (FGR; $\leq 10^{\text{th}}$ percentile), prematurity (≤ 37 weeks gestation), or neonatal death (in the first 28 days of life), birth weight and birth defects were also investigated.

Data were analyzed statistically by SPSS 20.0 (Statistical Package for the Social Sciences) and descriptive data were given as mean \pm SD and frequency. Chi-square and Student's t tests were used in statistical evaluation. Statistical significance was accepted at 95 % confidence level ($p \leq 0.05$).

RESULTS

Maternal baseline clinical characteristics are shown in Table 1.

Table 1: Clinical characteristics of pregnant patients with cardiac disorders

| n | 115 |
|---------------------------------------|------------------|
| Age (mean \pm sd) | 30.9 \pm 5.1 |
| Nulliparity (n, %) | 56, 48.3 |
| Birth week (mean \pm sd) | 37.5 \pm 2.9 |
| Birth weight (gram, mean \pm sd) | 2947 \pm 674.6 |
| Cesarean delivery rate (n, %) | 96, 82.8 |
| Recurrent cesarean | 37, 38.5 |
| Maternal heart disease | 18, 18.7 |
| CPD | 14, 14.5 |
| Fetal distress | 8, 8.3 |
| Malpresentation | 6, 6.2 |
| FGR (n, %) | 15, 12.9 |
| Maternal mortality (n, %) | - |
| Perinatal mortality (n, %) | - |
| NYHA functional classification (n, %) | |
| I | 78, 67.1 |
| II | 21, 18.2 |
| III-IV | 17, 14.7 |

CPD; Cephalopelvic disproportiyon
 FGR; Fetal growth restriction
 NYHA; New York Heart Association

The mean age of gestation at delivery was 37.5 \pm 2.9 and the mean birth weight was 2947 \pm 674 g. The categorization of the patients according to the NYHA functional classification were determined to be 67.1, 18.2 and 14.7% in NYHA stage I, II and III-IV, respectively. There was no perinatal and maternal mortality encountered. Table 2 presents the distribution of patients according to the NYHA staging system and types of heart disease. The percentage of heart disorders was 51.3% and 27.8% for rheumatic heart disease (RHD) and CHD, respectively. The rate of combined RHD and CHD was 12.2%. Five patients had prosthetic valves. One mitral regurgitation as-

Table 2: Distribution of the patients according to the type of cardiac disease and NYHA classification

| NYHA class | n (%) | I | II | III-IV |
|---------------------------------|----------|----|----|--------|
| Rheumatic heart disease | 59, 51.3 | | | |
| Mitral stenosis | | 2 | - | 1 |
| Mitral regurgitation | | 15 | 2 | 2 |
| Tricuspid stenosis | | - | - | - |
| Tricuspid regurgitation | | 1 | 1 | - |
| Aortic stenosis | | 1 | - | 2 |
| Aortic regurgitation | | 2 | - | - |
| Multivalvular lesion | | 18 | 10 | 2 |
| Congenital heart disease | 32, 27.8 | | | |
| Atrial septal defect | | 5 | - | 3 |
| Ventricular septal defect | | 7 | 3 | - |
| Tetralogy of fallot | | 1 | - | 1 |
| Ebstein anomaly | | 1 | 1 | - |
| Mitral valve prolapse | | 7 | 1 | 2 |
| CHD+RHD | 14, 12.2 | 9 | 1 | 4 |
| Others | 10, 8.7 | | | |
| Dilated cardiomyopathy | | - | - | 1 |
| Hypertrophic cardiomyopathy | | 1 | - | - |
| Arrhythmia | | 8 | 1 | - |

Table 3: The clinical features according to the NYHA classification

| | I-II (n=98) | III-IV (n=17) | P |
|---------------------------------------|----------------|------------------|-------|
| Gestational age at delivery (mean±sd) | 38.1±2.5 | 34.1±2.9 | 0.000 |
| Birth weight (gram, mean±sd) | 3100.9±567.2 | 2148.7±600.1 | 0.000 |
| Cesarean section (n, %) | 80, 81.6 | 15, 88.2 | 0.507 |
| Perinatal morbidity (n, %) | | | |
| FGR | 13, 13.3 | 2, 11.8 | 0.865 |
| NICU admission | 10, 10.2 | 11, 64.7 | 0.000 |
| Maternal morbidity (n, %) | 7, 7.1 | 11, 64.7 | 0.000 |

FGR; Fetal growth restriction, NICU; Neonatal intensive care unit.

sociated with history of operated atrial myxoma and, one aortic regurgitation associated with myotonic dystrophy. Multivalvular lesions were the most common lesions in RHD (30/59). Mitral regurgitation was the most common isolated and concomitant valvular lesion (19/59). There were two cardiomyopathy cases and nine arrhythmia cases. One patient with arrhythmia had a pacemaker. Ventricular septal defect (VSD) was the most common congenital heart disease (10/32). There were four patients with operated atrioventricular septal defect (ASD) and

one patient with VSD operated before pregnancy. Two patients were operated before pregnancy because of tetralogy of Fallot and Epstein anomaly. Both delivered prematurely due to their poor cardiac functional capacity.

The clinical stages of the patients according to the NYHA staging system are shown in Table 3. 85.2% of them (98/115) were in the NYHA stage I-II. There was no statistically significant difference between cesarean and FGR rates between NYHA stage I-II and stage III-IV groups

Table 4: Maternal complications in pregnancies complicated with heart diseases

| Patient | Type of heart disease. | NYHA class | Complication |
|---------|------------------------------|------------|--------------------------|
| 1 | Multivalvular lesion | I | ICU admission |
| 2 | Multivalvular lesion + VSD | II | ICU admission |
| 3 | Dilated cardiomyopathy | III-IV | Ventricular fibrillation |
| 4 | VSD | II | ICU admission |
| 5 | Multivalvular lesion | II | ICU admission |
| 6 | Multivalvular lesion | II | ICU admission |
| 7 | Operated Tetralogy of Fallot | III-IV | ICU admission |
| 8 | Multivalvular lesion | II | ICU admission |
| 9 | Mitral regurgitation | I | Preeclampsia |
| 10 | Operated ASD | III-IV | Ablatio placenta |
| 11 | Mitral stenosis | III-IV | ICU admission |
| 12 | Mitral valv prolapsus+ | III-IV | ICU admission |
| 13 | Multivalvular lesion | III-IV | Heart failure |
| 14 | Operated ASD | III-IV | ICU admission |
| 15 | Operated PDA+Aort stenosis | III-IV | ICU admission |
| 16 | Bicuspid aorta+Aort stenosis | III-IV | ICU admission |
| 17 | Multivalvular lesion | III-IV | Heart failure |
| 18 | Multivalvular lesion | III-IV | Heart failure |

($p > 0.05$). However, mean gestational age at delivery and mean birth weight were significantly higher in the NYHA I-II group ($p < 0.001$). Maternal morbidity and NICU admission rates (all related to preterm delivery) were significantly higher in the NYHA III-IV group ($p < 0.001$).

Obstetric complications in pregnancies complicated with cardiac disorders are shown in Table 4.

Maternal morbidity was observed in 18 (15.6%) patients. One patient with functional class III-IV associated with dilated cardiomyopathy developed ventricular fibrillation. Heart failure occurred in three patients with multivalvular lesion and functional class III-IV after delivery and managed with medical treatment. Twelve patients were taken to the intensive care unit for close monitoring due to heart diseases. Preeclampsia and ablatio placenta occurred in two different cases as obstetric complications. There is no maternal and perinatal mortality in our cases.

DISCUSSION

Rheumatic heart diseases constitute 51.3% of heart diseases in patients admitted to our obstetric clinic. Recently, Owens et al. (6) reported 40% of valvular heart disease in New York. This rate was 25% in European Society of Cardiology's results (10). The rate of rheumatic heart valve disease previously performed in our clinic was 87.5% (11).

This was in accordance with reports from Egypt (12), India (13), and Latin American countries (14). Early diagnosis and treatment of rheumatic diseases as a result, reduced the incidence of RHD in developing countries such as Turkey. We found that that multivalvular lesion was the most common lesion among patients with rheumatic heart disease and pregnancy. Mitral regurgitation was alone or in combination in the majority of cases close to the results of Köşüş et al. (15) and the European Society of Cardiology (10).

In developing countries, the proportion of pregnant women with CHD is increasing due to the increase in the quality of pediatric surgical techniques and neonatal care (16). We have shown that the incidence of CHD (27.8%) increasing, compared to previous data from Turkey (11). VSD was the most common pathology in our study. Aggarwal et al. (17) reported that VSD was the predominantly congenital defect followed by ASD. Fetal echocardiography should be recommended to women with CHD because of the high risk of having a baby affected by CHD (18). We found only right aortic arcus in a fetus where fetal echocardiography was performed due to maternal VSD.

Heart disease during pregnancy was associated with an increased risk of perinatal adverse outcomes (12). Cardiac

functional status of the mother entering the pregnancy is the most important factor that determines the outcome of successful pregnancy (14). 85.3% our patients were in the good functional group (NYHA classes I and II). In most other series, close rates for NYHA classes I and II have been reported (11,13,19). The mean gestational age at delivery and, the mean birth weight were significantly lower in the NYHA III-IV group. Maternal morbidity and NICU admission rates (all of associated with preterm delivery) were significantly higher in the NYHA III-IV group. Cyanosis or NYHA class III-IV were reported as predictive factors for perinatal mortality and morbidity (11,14,20). Hemodynamic compliance, placental insufficiency and cardio-active drugs (digital, diuretics, and beta blockers), such as causes, low birth weight incidence has been reported in patients with heart disease during pregnancy (13,21). All patients with cardiac disease had a slight increase in FGR compared to the normal population. However, we could not find a significant difference in FGR rates between the NYHA stage I-II and stage III-IV groups.

Cardiomyopathy is a rare condition during pregnancy, but it is difficult to manage pregnancy with left ventricular dysfunction due to the risk of adverse side effects for both the mother and the newborn (10). In our cases, one patient with dilated cardiomyopathy and 20% ejection fraction developed ventricular fibrillation during hospitalization at 34 weeks of gestation. It was administered with an internal cardioverter defibrillator and was delivered urgently with preop amiodarone.

Vaginal delivery is preferred for the patient with heart disease. Hemodynamic fluctuations associated with blood loss, risk of thromboembolism, infection and other post-operative complications which could compromise care of the pregnant with heart disease are significantly greater in cesarean delivery than vaginal delivery (22). However, in our study we found high cesarean delivery rate which mostly indicated for recurrent cesarean history compared to other reports (6,11,14). We planned cesarean delivery with maternal heart disease indication for NYHA stage III-IV because of cardiologists' recommendation and possibility of need for intensive care unit. We could not find a significant difference between the NYHA stage I-II and stage III-IV groups in cesarean rates similar to Davutoglu et al. report (23).

The main limitations of this study are retrospective design and small sample size. Large prospective series with good control populations from different countries can provide the best possible information for comparison.

CONCLUSION

As a result, although RHD is a gradually declining trend in Turkey, it is still dominant. Perinatal outcome is better in NYHA class I-II patients than in NYHA class III-IV patients.

Even though there is no maternal and perinatal mortality in our cases, pregnant patients with heart disease have high morbidity and appropriate coordination between the obstetrician and the cardiologist is necessary to advise these patients before and during pregnancy.

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