

Pregnancy complicated by heart disease: Clinical analysis of 116 patientsWei Miao¹, Qing Miao^{2*}¹Department of Obstetrics & Gynecology, The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, China²Department of Dermatology, The First Affiliated Hospital Of Zhengzhou University, Zhengzhou 450052, China
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Abstract: To investigate the incidence of pregnancy complicated by various forms of heart diseases and to analyze the effect of cardiac function on pregnant women and perinatal infants, the clinical data of 116 women were retrospectively analyzed whose pregnancy was complicated by heart diseases admitted to the First Affiliated Hospital of Zhengzhou University between January 2006 and December 2011. The results show that Congenital heart disease (CHD, 52 patients, 44.83%) accounted for complications in arrhythmia (16 patients, 13.79%), hypertensive heart disease (7 patients, 6.03%), and myocarditis 5 patients, 4.31%). A significant difference was observed in gestation length and the average newborn weight between the patients with New York Heart Association (NYHA) functional class I/II and those with NYHA class III/IV ($P < 0.05$). The rate patients who underwent caesarean delivery was 72.22%, and no perinatal mortality was observed in cases of pregnancies complicated by heart diseases. The results indicate that while CHD ranks first among heart diseases complicating pregnancy, RHD continues to be a complication in a large number of pregnancies in rural areas. Different cardiac functions affect gestation and newborn weight, and caesarean delivery at appropriate time may improve pregnancy outcomes.

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1. Introduction

Pregnancy complicated by heart disease is a common complication in high-risk pregnancy in obstetrics and is a leading cause of maternal death. In this study, we analyzed the clinical data of 116 pregnant women admitted to the First Affiliated Hospital of Zhengzhou University between January 2006 and December 2011 with pregnancies complicated by heart disease, investigated the incidence of various types of heart diseases complicating pregnancy, and explored the effect of pregnancy complicated by heart disease on pregnant women and perinatal infants.

2. Methods and Methods

Between January 2006 to December 2011, 16,159 women delivered babies in the obstetrics department of the hospital, and we detected 116 pregnancies complicated by heart disease, which constituted 0.72% of the total pregnant women. Of the 116 women (age, 20 to 42 years; mean age, 28.20 years), 65 were primipara, and 51 were multipara (2 patients had twin fetuses). 66 pregnant women belonged to the rural areas, and remaining 50 were from the urban areas.

This study was approved by the institutional review board of the First Affiliated Hospital of Zhengzhou University (Zhengzhou, China) and written informed consent was obtained from every participant.

The heart disease was diagnosed on the basis

of the medical history, signs, laboratory examination, and other related auxiliary examination. The cardiac function was classified according to the New York Heart Association (NYHA) functional classification.

Student's *t*-test was used to compare the measurement data.

3. RESULTS**3.1 Incidence of different types of heart diseases**

The most common heart disease complicating the pregnancy of the 116 women was congenital heart disease (CHD) followed by rheumatic heart disease (RHD) (Table 1).

Table I prevalence of cardiac disease in pregnancy

Form	Number	(%)
Congenital heart disease	52	(44.83)
Rheumatic heart disease	36	(31.03)
Unknown arrhythmia	16	(13.79)
Hypertensive heart disease	7	(6.03)
Myocarditis	5	(4.31)

3.2 Cardiac function classification

Of the 116 women, 31 belonged to NYHA class I, 50 to class II, 29 to class III, and 6 to class IV; RHD and CHD were predominant in patients with cardiac function class III and IV.

3.3 Selection of the method of delivery

Caesarean delivery was performed in 75 (64.66%) of the 116 women whose pregnancy was complicated by heart disease, including 20 patients who underwent caesarean delivery in combination with bilateral tubal ligation according to the requirements of the patients and their families. Vaginal delivery was performed in 41(35.34%) patients. In addition, caesarean delivery was performed in all pregnant women with cardiac function class III and IV, while the indications of cesarean delivery for women with cardiac function class II were also extended.

3.4 Effect of pregnancy complicated by heart disease on perinatal infants

The mean gestation length (time of pregnancy termination) and newborn weight in pregnant women with cardiac function class III and IV were both significantly lower than those in women with cardiac function class I and II ($P < 0.05$) (Table 2). Six pregnant women with cardiac function IV and fifteen of that with cardiac function III had a premature delivery and low weight of the newborn. Seven babies were admitted to Neonatal intensive care (NICU) .

Table II. Relationship between cardiac function classification and gestation length and newborn weight (Mean \pm Standard deviation)

Cardiac function classification	Number	Gestation (week)	Average newborn weight (kg)
I-II	81	38.5 \pm 2.6	3.50 \pm 0.92
III-IV	35	34.0 \pm 1.6	2.25 \pm 0.51

3.5 Effect of pregnancy complicated by heart disease on pregnant women

In the 29 patients with cardiac function class III, 5 patients had heart failure, and heart failure was detected in 3 of the 6 patients with cardiac function class IV, including 1 patient who died of CHD (ventricular septal defect), Eisenmenger's syndrome, and severe preeclampsia. The patient was from the rural areas, and she never received perinatal healthcare. The patient was admitted to hospital with a complaint of menopause for 8 months and chest tightness and palpitation for 6 days. Her blood pressure was 148/103 mmHg and cardiac function class IV. The patient underwent cesarean delivery on 33⁺² weeks of pregnancy and died of acute pulmonary embolism 3 days after surgery.

4. Discussion

The incidence of pregnancy complicated by heart disease is about 1% (Davies & Herbert, 2007), and the the form of heart disease complicating pregnancy has changed over a period of time. In the

recent years, CHD ranks first among the heart diseases complicating pregnancy (Curtis et al., 2009; Fernandes et al., 2010). With the recent advances in cardiac surgery, CHD may be cured at an early stage or partly rectified; the number of pregnant women whose condition is complicated by CHD is increasing, thereby causing a significant increase in the incidence of pregnancy complicated by heart disease. The present study showed that CHD ranked first and accounted for 44.83% of the heart diseases complicating pregnancy.

The incidence of RHD was 31.03%, ranking second, and most of the women whose pregnancy was complicated by RHD (72.00%, 36/50) were from countryside, which indicated that the incidence of RHD reduces with the effective control of rheumatic fever. However, the high number of women with pregnancies complicated by RHD is attributable to the limited medical services available in rural areas. Madazli et al. (Madazli et al., 2010) reported that the rate of RHD was 87.5% in pregnancy complicated by heart disease, while other reports (Koregol et al., 2009; Doshi et al., 2010; Thanajiraprapa & Phupong, 2010; Jatavan et al., 2011) also indicate that RHD continues to be prevalent in some developing countries. Thus, our findings suggest that the form of heart disease complicating pregnancy is significantly correlated with regions and ages.

Our results showed that the mean gestation length and newborn weight in patients with cardiac function class III and IV were significantly lower than those in the patients with cardiac function class I and II ($P < 0.05$). Six pregnant patients with cardiac function IV had preterm delivery and reduced birth weight. A similar finding was also reported in another study (Gelson et al., 2011). In pregnant women with heart disease, particularly those with cardiac insufficiency, blood circulation is under hypoxic condition, and inadequate perfusion of blood flow is observed in tissues, which affects fetal growth and development and leads to the delivery of low-birth-weight infants. In addition, pregnant women with cardiac insufficiency are rescued, which leads to increase in iatrogenic prematurity. Therefore, for the patients whose pregnancy is complicated by heart disease, assessment and monitoring of cardiac function should be strengthened with the cooperation of physicians and obstetricians to maintain the cardiac function within the range of class I and II, which is not only benefits the pregnant women but also improves perinatal quality.

Heart disease has been the overall leading cause of maternal death (Brooks, 2011; Burlingame et al., 2012). The blood volume increases during pregnancy, which leads to significant increase in cardiac burden compared to that during non-pregnancy, and further

aggravation of cardiac burden in patients with heart disease. The uterus enlarges during the last trimester, the diaphragm rises, and the heart shifts to the left upper position, which is a risk factor for the heart disease patients with reserve dysfunction and may lead to the development of a fatal complication. Gestation of 32–34 weeks, childbirth, and within 3 days postpartum are the most predominant period of blood flow changes; therefore, it is extremely important to strengthen the monitoring and treatment. Vaginal delivery promotes cardiac arrhythmia and worsens heart failure because of the 15%–45% increase in basal cardiac output and 10%–25% incremental outputs with every uterine contraction (Wang et al., 2011). Cesarean delivery can decrease the hemodynamic changes caused by long-term uterine contraction. In the present study, caesarean delivery was performed in all pregnant women with cardiac function class III and IV, and the indications of cesarean delivery for cardiac function of class II were extended. Most pregnant women had good general conditions after surgery and stable life signs, and the cardiac function of patients with cardiac insufficiency improved rapidly. In addition, because of the request of the patients and their families, caesarean delivery in combination with bilateral tubal ligation was performed in women in whom gestation was not proper or in those who did not wish to become pregnant again; the operation procedure was smooth. Therefore, it is thought that the indication of caesarean delivery can be extended, and caesarean delivery in combination with bilateral tubal ligation is safe and feasible for women who did not wish to become pregnant.

In our study, 1 patient who died had CHD (ventricular septal defect and Eisenmenger's syndrome) complicated by severe preeclampsia. The patient died of acute pulmonary embolism 3 days after surgery. Eisenmenger's syndrome is defined as the CHD (ventricular septal defect) complicated by pulmonary hypertension in which a right-to-left shunt causes cyanosis (Xing et al., 2011). Pregnancy complicated by Eisenmenger's syndrome leads to poor prognosis, and the presence of severe heart failure, infectious endocardium, and embolism. The fatality of pregnant women with Eisenmenger's syndrome is 50% (Román et al., 2011); the pulmonary circulatory blood volume reduces, severe hypoxia is present in important organs, and thromboembolism develops. Eisenmenger's syndrome complicated by hypertensive heart disease during pregnancy is responsible for the high fatality (Wang et al., 2011).

Other studies also showed that pregnant patients whose pregnancy is complicated by Eisenmenger's syndrome had poor cardiac function, and it has become the leading cause of death in the case of

pregnant women (Ananaba et al., 2011; Wang et al., 2011). Therefore, it is strongly suggested that pregnancy should be prohibited or terminated in patients with Eisenmenger's syndrome.

In summary, pregnancy complicated by heart disease is a high-risk pregnancy and is a leading cause for maternal fatality. Obstetricians should improve method of diagnosis and treatment of pregnancies complicated by heart disease. In addition, health education should be paid a lot of attention, particularly in rural areas, to improve the awareness and emphasize on the disease. Contraception should be strictly performed in women in whom pregnancy is not suitable or the pregnancy should be terminated during the early trimester. Pregnant women with heart disease should periodically receive perinatal health examination and should be managed by the department of obstetrics and cardiology to optimize the outcome and reduce the mortality of pregnant women as far as possible.

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References

1. Ananaba IE, Hare JY, Franklin WJ. 2011. The pregnant patient with congenital heart disease. *Methodist DeBakey cardiovascular journal* 7: 9-12.
2. Brooks R. 2011. Pregnancy and heart disease: An introduction. *British Journal of Midwifery* 19: 763-772.
3. Burlingame J, Horiuchi B, Ohana P, Onaka A, Sauvage LM. 2012. The contribution of heart disease to pregnancy-related mortality according to the pregnancy mortality surveillance system. *Journal of perinatology : official journal of the California Perinatal Association* 32: 163-169.
4. Curtis SL, Marsden-Williams J, Sullivan C, Sellers SM, Trinder J, Scrutton M, et al. 2009. Current trends in the management of heart disease in pregnancy. *International journal of cardiology* 133: 62-69.
5. Davies GA, Herbert WN. 2007. Assessment and management of cardiac disease in pregnancy. *Journal of obstetrics and gynaecology Canada : JOGC* 29: 331-336.
6. Doshi HU, Oza HV, Tekani H, Modi K. 2010. Cardiac disease in pregnancy--maternal and perinatal outcome. *Journal of the Indian Medical Association* 108: 278-280, 282.

7. Fernandes SM, Arendt KW, Landzberg MJ, Economy KE, Khairy P. 2010. Pregnant women with congenital heart disease: cardiac, anesthetic and obstetrical implications. *Expert review of cardiovascular therapy* 8: 439-448.
8. Gelson E, Curry R, Gatzoulis MA, Swan L, Lupton M, Steer P, et al. 2011. Effect of maternal heart disease on fetal growth. *Obstetrics and gynecology* 117: 886-891.
9. Jatavan T, Luewan S, Tongsong T. 2011. Outcomes of pregnancy complicated by heart disease at Maharaj Nakorn Chiang Mai Hospital. *Journal of the Medical Association of Thailand* 94: 1159-1163.
10. Koregol M, Mahale N, Nayak R, Bhandary A. 2009. Maternal and perinatal outcomes of pregnancies complicated by cardiac disease. *Journal of The Turkish German Gynecological Association* 10: 30-34.
11. Madazli R, Sal V, Cift T, Guralp O, Goymen A. 2010. Pregnancy outcomes in women with heart disease. *Archives of gynecology and obstetrics* 281: 29-34.
12. Román R, P., Pérez T, J., Chang EG, Couret C, M.P., Nodarse A, Sanabria AM. 2011. The Eisenmenger's syndrome and the pregnancy. *Revista Cubana de Obstetricia y Ginecologia* 37: 235-242.
13. Thanajiraprapa T, Phupong V. 2010. Pregnancy complications in women with heart disease. *The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstet* 23: 1200-1204.
14. Wang H, Zhang W, Liu T. 2011. Experience of managing pregnant women with Eisenmenger's syndrome: maternal and fetal outcome in 13 cases. *The journal of obstetrics and gynaecology research* 37: 64-70.
15. Xing XQ, Li ZD, Liu YH, Yang ZJ, Wei X, Xiao Y, et al. 2011. [Analysis of Eisenmenger's syndrome associated with pulmonary artery thrombosis]. *Chinese critical care medicine* 23: 568.

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