

Pregnancy and Childbirth in Women with Congenital Cardiovascular Anomalies and Prospective Follow-Up of Newborns

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Abstract

The article presents 2 clinical cases of pregnancy and childbirth in women with congenital cardiovascular anomaly: with CHD (tetralogy of Fallot), as the number of women becoming pregnant and giving birth to children after surgery for CHD is increasing due to better diagnosis of congenital cardiovascular anomalies and timely cardiac surgery. However, there are sporadic cases of parents' refusal of surgery; then pregnancy and childbirth develop with CHD taking its natural course. The outcomes of pregnancy and childbirth and prospective follow-up of newborns have been studied. The article shows that such factors as parents' underestimation of the severity of cardiovascular pathology in a child, failure to follow doctor's recommendations, refusal of treatment predict unfavourable prognosis for the life of both a young woman and a newborn. Therefore, all patients with congenital cardiovascular anomalies should be managed and give birth to children in specialized clinics.

Keywords: *Pregnancy; Cardiovascular Anomalies; Newborns*

Introduction

Cardiovascular diseases (CVD) are one of the most common pathologies complicating the course of pregnancy, childbirth and the postpartum period. These diseases contribute to the imbalance of the mother-placenta-fetus system and lead to the development of placental insufficiency, chronic intrauterine hypoxia and fetal growth retardation [1-4]. CVDs, congenital heart defects (CHD) in particular, are the main reason of maternal mortality among all extragenital pathology being responsible for 80 - 85% of deaths. They have been considered a contraindication for pregnancy for many years. At present, due to the improvement in the diagnosis of congenital cardiovascular anomalies and well-timed cardiac surgeries, the number of women who get pregnant and deliver children after surgery for CHD is increasing. However, there are sporadic cases when the girls' parents refuse surgery; subsequently pregnancy and childbirth in such patients develop with CHD and/or severe heart rhythm disorders (HRD) taking their natural course. Analysis of the literature data [5-7] has shown that there develop the following changes in the CVS during pregnancy: increased stroke volume of the heart, increased heart rate, a significant increase in cardiac output, decreased peripheral vascular resistance, increased volume of circulating blood, mainly due to plasma, redistribution of blood, compression of the inferior vena cava by the uterus (the third trimester), a slight enlargement of the heart chambers, a change in the position of the heart in the chest cavity, hypercoagulability of blood (the second half of pregnancy), the reduction in plasma potassium concentration, increased renal clearance, slight respiratory alkalosis, decreased plasma oncotic pressure, blood loss during labour. Accordingly, the effect of pregnancy on hemodynamics of CHD can be: 1) little or even favourable in case of CHD with a left-to-right shunt with no pulmonary hypertension, mitral and aortic insufficiency, as there is a decrease in systemic peripheral

resistance in such disorders; 2) unfavourable: a) in case of defects with a right-to-left shunt, since there is an increase in shunting due to a decrease in systemic resistance and an increase in venous return to the right heart; b) in case of stenosis and other obstructive defects, since the pressure gradient increases due to a significant increase in cardiac output.

Aim of the Study

To present the authors' own observations of pregnancy, labour and childbirth in three women with congenital cardiovascular pathology and to follow-up the newborns.

Case Report

We observed 2 pregnant women with congenital cardiovascular pathology: with CHD (tetralogy of Fallot) and 2 newborns. The examination of both pregnant women and newborns included: physical examination, biochemical tests, ECG, Holter monitoring, ABPM, fetal Doppler echocardiography, Doppler echocardiography of the women and neonates.

Results and Discussion

Pregnancy, labour and childbirth in women after surgeries for CHD proceed favourably for both mother and child. However, pregnancy, labour and childbirth in women with the natural course of some CHD, pose a risk to the health of a pregnant woman, as illustrated by the following examples.

Clinical case 1

Pregnant woman P, 33 years of age diagnosed with CHD (tetralogy of Fallot). Past medical history of the patient reveals that the diagnosis of CHD (tetralogy of Fallot) was made immediately after birth. She was followed-up by a pediatric cardiologist. At the age of 3, she was operated on at Research Centre of Cardiovascular Surgery named after N. Amosov (the city of Kiev). The first palliative stage of the CHD correction was performed: the Blalock-Taussig right subclavian-pulmonary artery anastomosis was created. The girl's parents categorically refused any surgical correction of the defect during all the years of observation, despite the repeated urgent recommendations of pediatric cardiologists and cardiac surgeons, explaining that the girl was in good health and did not make any complaints. At the time of pregnancy, the systolic gradient at the site of pulmonary stenosis was about 40 mmHg and the anastomosis was functioning (Figure 1).

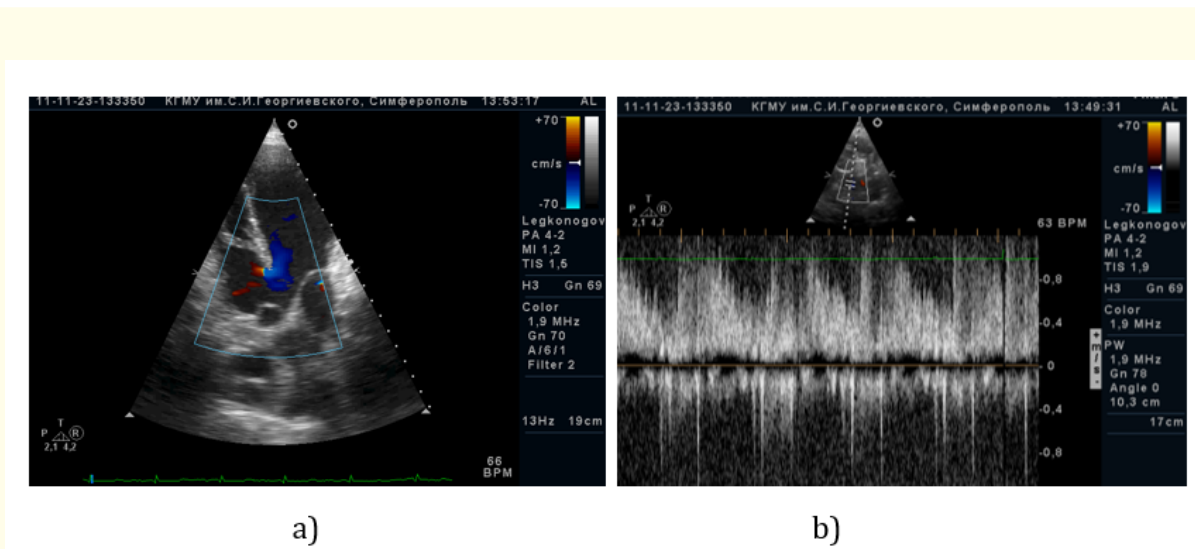


Figure 1: Doppler echocardiography of pregnant woman P. 24 yr. CHD, tetralogy of Fallot: a) Blalock-Taussig anastomosis, b) supra-valvular stenosis of the pulmonary artery ($\Delta P = 30 - 40$ mmHg).

The obstetric history reveals that it was the second pregnancy and the second birth. During pregnancy the patient was under the supervision of a cardiologist. Taking into account that the patient had CHD, she delivered her first baby at Research Institute OKHMADET (Kiev) with no complications. The child is currently 9 years old and healthy. The second pregnancy was desired. During pregnancy the patient was under the supervision of a cardiologist, who revealed an increase in the systolic pressure gradient in the pulmonary artery. The pregnancy was difficult, with symptoms of hypoxia in both the woman and the fetus and a risk of miscarriage in the second trimester. The delivery was premature at 28 weeks, fast, natural. The early and late postpartum periods were uncomplicated. The baby was born with a mass of 2550 gr, height 50 cm, an Apgar score between 7 and 8, cried immediately after birth. Now the girl is 1.5 years old and lags a little in physical development, her condition being satisfactory. Patient P. was repeatedly recommended to get a surgical treatment for CHD at A.N. Bakulev National Medical Research Center of Cardiovascular Surgery (Moscow). However, she categorically refused the operation though her condition had become worse last year. Thus, in a woman with CHD (tetralogy of Fallot, the condition after creating the Blalock-Taussig anastomosis), two pregnancies ended in vaginal delivery. Children are healthy. However, a surgery for CHD should have been performed in her childhood, which would have minimized the risks during pregnancy and childbirth.

Clinical case 2

Patient D., born in 1997, with a diagnosis of CHD (tetralogy of Fallot) was under our supervision. She was first diagnosed with CHD at a maternity hospital and since then was under the supervision of pediatric cardiologists (until she was 18). At the age of 4, tetralogy of Fallot was repaired with surgery, after which hemodynamic parameters were monitored annually: the results of the surgery were observed to be good (ΔP LA 18 mmHg, no signs of an intracardiac shunt). At the age of 21, she sought medical attention because of pregnancy. She had an acute viral infection at 15 weeks of gestation and polyhydramnios at 38 weeks. Fetal screening tests were performed according to the schedule. A fetal CHD (tetralogy of Fallot) was diagnosed at 20 weeks of gestation, and placententesis was performed to exclude hereditary pathology. Shortness of breath of exertion and fatigue developed at 11 - 12 weeks of gestation. Taking into account the diagnosis - the condition after a surgical repair of the tetralogy of Fallot, the patient was admitted to a cardiology clinic, where a complete examination was performed. She delivered a baby at 40 weeks by Cesarean section. A full-term girl was born. The Apgar score was 8-9 points, body weight at birth being 3800 gr and the height 53 cm. The condition of baby B. had been severe since birth due to respiratory disorders, peripheral hemodynamic disorders, and neurological symptoms. On the second day, the child was transferred to the neonatal pathology department, where she was diagnosed with CHD, tetralogy of Fallot (severe LA valve stenosis with ΔP 104 mm Hg; circulatory failure IIa). The child's condition was stabilized and she was discharged from the hospital to be followed-up by a pediatric cardiologist. At the age of 4 months (Figure 2 and 3), the gradient of systolic pressure on LA decreased to 75 mm Hg and the child was sent to A.N. Bakulev National Medical Research Center of Cardiovascular Surgery (Moscow) where she underwent a surgical repair of tetralogy of Fallot with a good outcome.

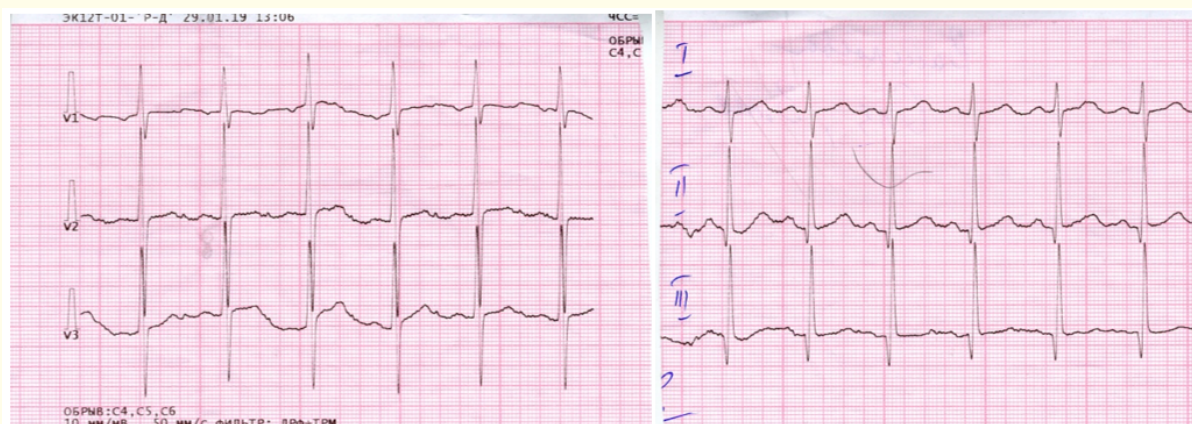


Figure 2: Chest x-ray of baby B, 4 months, CHD (tetralogy of Fallot).

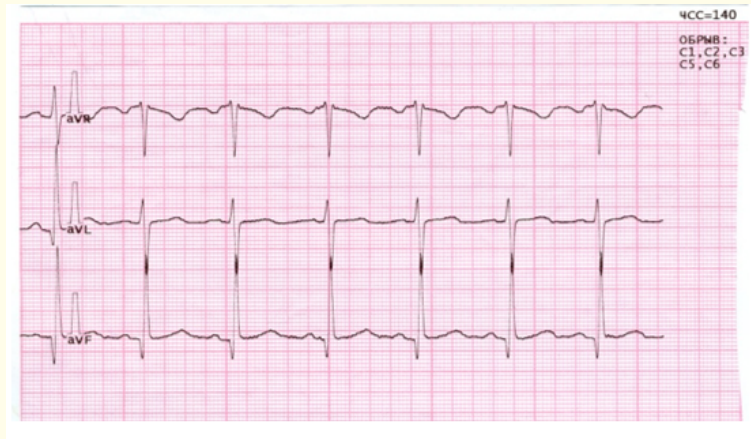


Figure 3: ECG of baby B, 4 months, CHD (tetralogy of Fallot).

Conclusion

Thus, parents' underestimating of the severity of the cardiovascular pathology in the child, their failure to comply with medical recommendations, refusal of treatment - all these factors subsequently are predictors of an unfavorable prognosis for both the life of a young woman and a newborn child. Therefore, all female patients with congenital cardiovascular pathology should be observed and deliver their babies at specialized centers.

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