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COMBINATION OF CONGENITAL HEART DEFECTS AND HP IN THE INITIAL SAMPLE OF FETAL ARRHYTHMIAS

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Abstract

Fetal arrhythmias occur in 1-5% of all pregnancies. Approximately 10% of all arrhythmias are accompanied by the development of hydrops fetalis and intrauterine mortality. Diagnosis and treatment of fetal arrhythmias is an interdisciplinary problem that has not yet been fully resolved. Malignant arrhythmias (supraventricular tachycardia, atrial flutter, complete transverse block) combined with hydrops fetalis cause intrauterine death in 3-30% of cases. Transient arrhythmias (single ventricular and atrial extrasystole, sinus tachycardia) occur in 15-32% of cases, according to 1998 data, and do not require special treatment. According to Strasburger JF, 2020 , supraventricular tachycardia and complete block are diagnosed in 1 in 5,000 fetuses. According to Ferrer PL, 2020 , complete AV block is detected in 1:20,000 live births. The same author suggests a twofold increase in the incidence of fetuses with this pathology due to the high risk of intrauterine death. Atrial flutter occurs in 30-46% of all cases of fetal tachyarrhythmias . The lack of global statistics on fetal arrhythmia cases is primarily due to the difficulty in detecting the presence of this cardiac pathology. Here, it is necessary to emphasize the leading role of routine examination of the pregnant woman and auscultation of the fetal heart as a screening method for diagnosing fetal arrhythmia. More than half of all fetal rhythm disorders are diagnosed in the third trimester of pregnancy. On the one hand, this indicates the possibility of long-term compensation for the existing pathology, on the other hand, it is explained by the woman's more frequent visits to the doctor at this stage of gestation. Detection of fetal arrhythmia in early

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pregnancy is associated with a high risk of intrauterine death. Ultrasound remains the primary method for diagnosing normal and abnormal fetal heart function. Various modes allow, in most cases, to differentiate atrial and ventricular contractions, determine the heart rate, detect the presence of fetal hydrops, and monitor the adequacy of therapy. Currently, ultrasound is the most accessible, easily performed, and informative method for diagnosing fetal arrhythmias.
One of the main problems in fetal arrhythmology is fetal hydrops. According to most authors, fetal hydrops complicates the course of supraventricular tachycardia and atrial flutter . The presence of fetal circulatory failure is a prognostically unfavorable factor. Both in terms of survival and treatment outcomes. The rate of hydrops progression depends on the degree of circulatory failure and, equally importantly, gestational age.

The aim of the study is to identify the spectrum of fetal and neonatal cardiac rhythm and conduction disorders, identify possible causes of their occurrence, and develop diagnostic methods, treatments, and outcomes.
To achieve this goal, the following tasks were solved.

Research objectives

1. To identify the spectrum of rhythm disturbances in the fetus, the etiological factors of their occurrence, and diagnostic methods.
2. Determine morphometric changes in fetal heart parameters depending on the type of arrhythmia
3. To develop optimal treatment options for fetal arrhythmias depending on their nature, the presence of associated pathologies, and the time of onset. To determine the relationship between intrauterine arrhythmia therapy and the likelihood of postnatal arrhythmia occurrence in the study group of newborns.

Research results

In recent decades, along with congenital heart defects, so-called functional diseases of the heart and blood vessels have become one of the most common diseases, with cardiac rhythm and conduction disorders playing a leading role.

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Thanks to the rapid development of prenatal cardiology, including prenatal Rhythmology has established that the origins of many arrhythmias lie in the prenatal period. Other arrhythmias are observed during pregnancy in 1-2% of women and are nonspecific symptoms of many pathological conditions. In recent years, a unique opportunity has emerged to protect fetal health by treating fetal heart rhythm and conduction disorders, preventing the development of severe postnatal complications. A Doppler echocardiogram (DECHO) performed at 18-19 weeks of pregnancy can diagnose fetal malformations, including congenital heart disease, identify cardiovascular dysfunction and fetal arrhythmias, and formulate a possible antenatal and postnatal prognosis.

The problem of arrhythmias in pregnant women remains relevant, as pregnancy creates conditions conducive to the development of various types of cardiac arrhythmias. Treatment of arrhythmias in fetuses and pregnant women deserves special attention. Drug therapy is administered to the mother and is based on the principle of integration within the maternal- placental -fetal system. When selecting antiarrhythmic therapy, it is essential to consider the changing maternal-placental physiology during pregnancy and have accurate information about the prescribed medication.

Fetal supraventricular tachycardia and complete transverse block are prognostically unfavorable, as they are accompanied by non-immune hydrops fetalis in 68% and 29% of cases, intrauterine and early neonatal death of the fetus in 32% and 29% of cases, respectively. The prognosis for fetal heart rhythm and conduction disorders is determined by fetal maturity and the timeliness of diagnosis. However, fetal maturity has less statistical significance than early detection ($p<0.05$). One of the leading risk factors for the development of arrhythmias in the fetus is an acute viral infection at any stage of pregnancy. One of the leading triggers for the development of arrhythmias in the neonatal period is an acute viral infection experienced in late pregnancy, i.e., probable fetal myocarditis.

The course of sinus arrhythmias and fetal extrasystole is favorable, as it is accompanied by circulatory failure in 3-5% of cases. Indications for early delivery when fetal organic tachyarrhythmia is detected include: 1) fetal anasarca,

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2) failure of antiarrhythmic therapy within 5 days and worsening fetal hydrops, and 3) prognostically unfavorable echocardiographic signs (turbulent blood flow in the vena cava, grade 2-3 tricuspid insufficiency).

The fundamental principles of prenatal diagnosis of cardiac arrhythmia and conduction disorders include assessing the atrial and ventricular rates and their relationships, identifying anatomical signs of heart defects, fetal hydrops, and hemodynamic compromise. Determining the following morphometric parameters of the fetal heart is a necessary and sufficient condition for obtaining reliable data for diagnosing fetal arrhythmia and prognosing the disease: the linear dimensions and ejection fraction of both ventricles, atrial size, vena cava diameter, and blood flow patterns at the tricuspid valve and in the vena cava.

The drug of choice for the treatment of fetal supraventricular tachycardia is digoxin , the route of administration and timing of use are determined by the proposed treatment algorithm. The drugs of choice for the treatment of neonatal supraventricular tachycardia are cordarone, propanorm, and digoxin. Discontinuation of antiarrhythmic drugs after 6-9 months of life does not result in recurrence of arrhythmia.

Conclusions

Antiarrhythmic therapy is indicated for supraventricular tachycardia before 33-34 weeks of gestation and frequent extrasystoles with symptoms of fetal circulatory failure. Metabolic therapy is necessary for blocked extrasystoles and sinus arrhythmias.

Indications for implantation of a pacemaker in the presence of complete transverse block are: 1) low heart rate (less than 55 beats/min), 2) dilation of the heart chambers, 3) increase in the size of the interatrial communication, 3) the appearance of ventricular replacement rhythms, 4) circulatory failure, 5) delayed psychomotor development, 6) insufficient weight gain in the first 6 months of life.

The introduction of the proposed algorithms for the diagnosis and treatment of fetal cardiac rhythm and conduction disorders into obstetric practice is justified

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from a clinical and economic point of view, as it helps to reduce perinatal and neonatal mortality rates and significantly reduces childhood disability .

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