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HEMOLYTIC DISEASE OF THE NEWBORN

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Abstract:

Among the most important problems of obstetrics and neonatology, one of the first places is occupied by the problem of the immunology of pregnancy and childbirth. Thanks to the introduction of prevention of Rh sensitization by administration of immunoglobulin, its frequency has decreased. At the same time, interest in rare antigens has increased. Intensive continued research in this area emphasizes the importance of prenatal preventive measures to prevent the development of excessive immunization of the fetus and newborn

Keywords: Pregnancy, Rh factor and blood group incompatibility, sensitization, newborn

INTRODUCTION

Starting from the first weeks of pregnancy, complex immunobiological relationships arise between the embryo and the maternal body, which largely determine the further course of pregnancy, the condition of the mother, and the development of the fetus and newborn child. In some cases, immunological incompatibility between mother and fetus becomes the cause of severe disorders of embryogenesis and postnatal development. Hemolytic disease of the newborn (HDN) is a prenatal disease that is caused by isoimmunization as a result of incompatibility between the blood of mother and fetus. Isoantibodies are formed in the mother's body, directed against the child's red blood cells and causing their hemolysis, or a sharp inhibition of their formation [2, 5]. Currently, 236 erythrocyte antigens are known, which are found in 29 genetically independent systems [2]. In the overwhelming majority of cases, hemolytic disease of the fetus and newborn is caused by sensitization of the mother with antigens of the Rh and ABO system. Much less frequently, it occurs when the blood of mother and fetus is incompatible for other antigens.

MATERIALS AND METHODS

According to the Fischer-Reis theory, there are 6

Rh genes, three dominant genes C,D.E and, accordingly, three recessive genes c,d,e. The D gene is of greatest importance, since it is the main cause of conflict between mother and fetus. Antigens of other systems (Kell, Duffi, Kidd, etc.), capable of causing hemolytic disease of the fetus and newborn, cause immunization as a result of blood transfusion to a woman at different periods of life or can be formed during transplacental transfusions from fetus to mother. The frequency of hemolytic disease due to blood incompatibility according to the ABO system has always been slightly higher and ranged from 1:200 to 250 births [2]. If we take into account all cases of early jaundice, damage to the fetus by antibodies of the AB0 system is observed 2-3 times more often than by other antibodies. Since the introduction of anti-D prophylaxis, the relative incidence of ABO incompatibility has increased further, and rare antigens (Kell, Duffy, E, C and c) have become increasingly important.

RESULTS AND DISCUSSION

Thus, we have a higher percentage of newborns affected by hemolytic disease caused by ABO incompatibility, compared to the frequency of this disease in Rh-incompatible pregnancies. At the same time, a significant number of children with A and B antigens on erythrocytes, born from ABO sensitized mothers, may not have signs of hemolytic disease of the newborn, which is explained by [4]:

□ High concentration of A and B dissolved fetal antigens in the placental tissues, fetal blood plasma, amniotic fluid, which provides significant inhibition of maternal anti-A, anti-B antibodies crossing the placenta.

□ Features of the structure of antigens A and B in newborns, which differs from that in adults, therefore fetal red blood cells bind a small amount of antibodies, even if there are many of them.

□ The greatest sensitivity of Fc receptors of placental tissue cells to IgG1 compared to IgG2. A study of the sera of pregnant women showed that almost all contain IgG2 anti-A, anti-B antibodies, so even high titers of IgG2 anti-A or anti-B antibodies will not cause a severe form of HDN. This fact explains why, in some cases, newborns have an antigen titer, but there is no HDN. On the other hand, there are cases when, in the presence of HDN, the direct antigen titer (Coombs test) is negative. This is due to the presence of anti-A, anti-B IgG3 subclass

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antibodies, the amount of which may be lower than the level detected by PAGT.

As numerous studies have shown, fetal red blood cells are detected in the maternal bloodstream in the third trimester of pregnancy quite regularly, but immunization does not always occur. The critical level or dose of antigen required to generate an immune response in pregnant women is much higher than in non-pregnant women (table).

Table. – Obstetric complications that contribute to the development of Rh sensitization

I trimester	- ectopic pregnancy - spontaneous miscarriage - medical abortion
II trimester	- spontaneous and induced abortions - genetic amniocentesis
III trimester	- childbirth - amniocentesis - placental abruption - placenta previa - toxicosis of the second half of pregnancy - multiple pregnancy - external rotation of the fetus - injury

For laboratory confirmation of the diagnosis of HDN according to the Rh system and other significant erythrocyte antigen systems, the following criteria are used [5]:

1. Presence of clinical evidence of the disease in the newborn.

2. The presence of alloantibodies in the mother's serum, the specificity of which has been established.

3. The newborn has an erythrocyte antigen, against which the mother has antibodies (based on the results of erythrocyte phenotyping).

4. The direct antiglobulin test (Coombs test) in the newborn is positive, therefore, alloantibodies are present on the red blood cells.

5. The results of the study of the eluate from the newborn's erythrocytes show that their specificity corresponds to the specificity of the mother's alloantibodies.

In ICD-X, hemolytic disease of the newborn is taken into account under the heading "Certain conditions arising during the perinatal period", as a variant of Rh immunization (P55.0) and ABO conflict (P55.1), as well as other forms hemolytic disease of the fetus and newborn (P55.8). Hydrops fetalis due to hemolytic disease (P56). Hydrops fetalis due to isoimmunization (P56.0). Hydrops fetalis due to other unspecified hemolytic disease (P56.9).

There are three main forms of hemolytic disease:

1) hemolytic anemia without jaundice and dropsy;

2) hemolytic anemia with jaundice;

3) hemolytic anemia with jaundice and dropsy. The mildest form of the disease is hemolytic anemia without jaundice and dropsy. Its main symptom is pallor of the skin in combination with a low amount of hemoglobin and red blood cells. Anemia in this form develops not so much due to hemolysis, but as a result of inhibition of bone marrow function and a delay in the release of immature and mature forms of red blood cells from it. The most common form of hemolytic disease of the newborn is hemolytic anemia with jaundice. Its most important symptoms are anemia, jaundice, and hepatosplenomegaly.

CONCLUSION

A modern complex of therapy for hemolytic disease of newborns makes it possible to reduce the intensity of hemolysis (immunoglobulin intravenously, exchange transfusion), remove excess bilirubin (replacement transfusion, hemotherapy, plasmapheresis), reduce the intensity of enterohepatic circulation (phototherapy, activated charcoal, cleansing enema). This set of measures allows for good results in terms of caring for a newborn and reducing disability. However, given the possibility of diagnosing this disease in the antenatal period, careful laboratory testing of pregnant women should be carried out when contacting an antenatal clinic. Early detection of an immunological conflict will reduce the likelihood of developing severe forms of hemolytic disease in a newborn and choose the most rational tactics for pregnancy management. Taking into account the great importance of previous sensitization in the pathogenesis of hemolytic disease of the newborn, as well as the presence of immunological mechanisms for the development of the disease, each girl should be considered as a future mother, therefore, transfusion of blood and its preparations should be carried out only for health reasons.

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