

EARLY ULTRASOUND DIAGNOSIS OF FETAL ANEMIA DURING RH-IMMUNIZATION

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✓ *Resume,*

Despite the significant achievements of perinatal medicine, the problem of hemolytic disease of the fetus and newborn against the background of Rh-conflict pregnancy in our country cannot be considered completely resolved.

Material et methods: In this regard, the results of the Dopplerometric measurement of the peak systolic velocity in the middle cerebral artery of the fetus in 102 pregnant women with Rh immunization and without immunization were presented. During the study, there was a significant increase in peak systolic velocity in the middle cerebral artery in the fetus in the 3rd and 4th group of pregnant women and a significant difference with the 1st and 2nd group.

Conclusions: Thus, dopplerometry is an effective method for the diagnosis of anemic and edematous forms of hemolytic disease of the fetus, requiring both antenatal care for pregnant women and postnatal care for newborns.

Key words: Rh- immunization, dopplerometry middle cerebral artery

РАННЯЯ УЛЬТРАЗВУКОВАЯ ДИАГНОСТИКА ФЕТАЛЬНОЙ АНЕМИИ ПРИ РЕЗУС-ИММУНИЗАЦИИ

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Несмотря на значительные достижения перинатальной медицины, проблема гемолитической болезни плода и новорожденного на фоне резус-конфликтной беременности в нашей стране не может считаться до конца решенной.

Материал и методы: Связи с этим было представлены результаты доплерометрического измерения пиковой систолической скорости в средней мозговой артерии плодов у 102 х беременных с резус-иммунизацией и без иммунизации.

Результат: при изучении было отмечено достоверное увеличение пиковой систолической скорости в средней мозговой артерии у плодов в 3-й и 4-й группе беременных и достоверное различие с 1-й и 2-й группой.

Вывод: таким образом, доплерометрия является эффективным методом диагностики анемичных, так и отечных форм гемолитической болезни плода, потребовавших как антенатального ухода за беременными, так и постнатального ухода за новорождёнными.

Ключевые слова: Rh-иммунизация, доплерометрия средней мозговой артерии

РЕЗУС-ИММУНИЗАЦИЯДА ҲОМИЛА КАМҚОНЛИГИНИ ЭРТА УЛЬТРАТОВУШ ДИАГНОСТИКАСИ

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Перинатал тиббиётда сезиларли ютуқларга қарамай, мамлакатимизда Rh-конфликт ҳомиладорлик фонида ҳомила ва янги туғилган чақалоқнинг гемолитик касаллиги муаммоси тўлиқ ўрганилмаган. Шу муносабат билан, Rh-иммунизацияси бўлган ва мавжуд бўлмаган 102 та ҳомиладор аёлларда доплерометрия усулида ҳомила ўрта мия ўртерияси систолик тезлиги ўлчанди. Тадқиқот натижасига кўра 1 ва 2 гуруҳ ҳомиладор аёлларга нисбатан 3 ва 4 гуруҳ ҳомиладор аёлларда ҳомила ўрта мия артериясининг систолик тезлиги чўққиси баландлиги аниқланди. Шундай қилиб, доплерометрия ҳомила гемолитик касаллигининг анемик ва шиш шакллари ташхислашда доплерометрия самарали усул бўлиб ҳисобланади.

Калит сўзлар: Rh-иммунизация, ўрта мия артерия доплерометрияси

Introduction

Doppler blood flow in the middle cerebral artery of the fetus is the main, easily accessible and most informative method for diagnosing the severity of fetal hemolytic anemia in rhesus conflict [1,2].

For the first time, a scientist from the United States Mari G. in 2000 described a method for measuring the peak systolic blood flow rate in the middle cerebral artery in the diagnosis of fetal hemolytic anemia of varying severity [3]. Later, the co-authors showed that the fetus

has a hyper dynamic type of cerebral circulation, in which the maximum systolic blood flow rate in the middle cerebral artery exceeds 1.5 Mom in relation to its physiological value, and begins to form when the hemoglobin in the blood is lower than 0.65 Mom from the average level typical for each gestation period [4, 5].

The sensitivity of the method for determining moderate and severe anemia is 100%, light-83%, the frequency of false positive results varies from 10 to 12% [6]. This method is currently recognized as the most effective for non-invasive detection of moderate and

severe fetal anemia and has finally replaced the spectrophotometric analysis of amniotic fluid [7,8].

According to foreign colleagues, if there is no timely diagnosis and treatment of RH-sensitization in pregnant women, perinatal mortality is approximately 17.5%, stillbirth rate is about 14%. It was found that in subsequent pregnancies, hemolytic disease of the newborn (HDN) is more severe than in the case of sensitization detected during the first pregnancy [9].

Despite significant achievements in perinatal medicine, the problem of hemolytic disease of the fetus and newborn against the background of RH-conflict pregnancy in our country cannot be considered completely solved.

The aim of the work is to compare dopplerometric indicators of peak systolic blood flow rate (PSR) in the middle cerebral artery (MSA) of fetuses in pregnant women with Rh-negative blood without immunization and with Rh-immunization.

Materials and methods

Ultrasound Doppler examination of fetuses in 102 repeatedly pregnant women with RH-negative blood was Performed at the Republican Perinatal Center. The age of pregnant women ranged from 19 to 44 years.

Ultrasound was performed on a Voluson E9 Expert device using sensors with a frequency of 3.5 MHz at 22-33 weeks of pregnancy. Fetometric parameters, the presence or absence of free fluid in the serous cavities, the amniotic fluid index (AFI), the location, size and degree of maturity of the placenta were evaluated during ultrasound. Fetoplacental blood flow in the umbilical cord artery, uterine arteries, and fetal middle cerebral artery (MSA) was studied during dopplerometry.

Blood flow was assessed during periods of absence of respiratory and motor activity in the fetus. We registered blood flow patterns three times, using their average value as the main One. To register the dopplerogram of blood flow in the MSA, the cross-sectional plane of the fetal head was initially visualized. We switched on the color Doppler mapping mode and visualized the vessels of the Wallisian circle. The volume of the vessel section to assess the Doppler frequency shift was positioned in the middle part of the SMA lumen so that it completely overlaps the vessel lumen.

All women were re-pregnant and divided into 4 groups: group 1 included 21 (20.6%) women who gave birth to children with Rh-negative blood. Group 2 is represented by 35 (34.3%) pregnant women who gave birth to children with Rh-positive blood without increasing the titer, Rh antibodies, in group 3 there were 28 (27.4%) women with RH-immunization who gave birth to children with HDN and who had a replacement blood transfusion (RBS) after delivery. The 4th last group was also represented by 18 (17.6%) women with Rh-immunization, but who antenatal underwent the operation «Intrauterine intravascular blood transfusion to the fetus» (IITF). 5 pregnant women (4.9%) out of 102 women, at the request of pregnant women, had a non-invasive DNA test for determining the Rh factor of the fetus from the mother's blood at 10-14 weeks, in one case the Rh (+) belonging of the unborn child was mistakenly determined.

Statistical analysis was performed taking into account the requirements for processing medical quantitative data using Statistic 8.0 programs. Correlation analysis was

performed using the nonparametric Spearman test, and qualitative characteristics were compared using the χ^2 criterion.

Results and discussion

Group 1 in 21 women of this group during pregnancy, there was no increase in the titer of both complete and incomplete Rh antibodies. This group is a control group. In 19 women (90.5%) the delivery was urgent, in 2 (9.5%) the delivery ended prematurely. None of the newborns in this group were born in a state of asphyxia. In all newborns, the blood Rh factor was determined, where it was negative.

Group 2 - 35 pregnant women with a Rh-antibody titer from 1: 4 to 1: 16. Interestingly, 2 women with the sixth pregnancy did not have RH antibodies in their blood. 11 (31.5%) patients were delivered by cesarean section according to obstetric indications, and 6 (17.1%) had premature deliveries. In this group, newborns showed no signs of hemolytic disease and, accordingly, did not require replacement blood transfusions in the early neonatal period.

Group 3 - 28 pregnant women with a RH antibody titer from 1: 8 to 1: 128, who gave birth to children with HDN and HDP, who required RBC in the early neonatal period in an amount from 1 to 2. interestingly, in 4 women (14.3%), paradoxically, there was no increase in the RH antibody titer in the antenatal period. 4 women underwent trans abdominal cordocentesis surgery for diagnostic purposes. The birth parity was from 2 to 9 births. 20 women (71.4%) had a history of various reproductive losses. The rate of premature birth in this group was (67.8%), i.e., 19 women. The remaining 9 women (32.1%) gave birth on time. 11 pregnant women (39.2%) were delivered surgically. In this group, cases of perinatal death were observed in 6 newborns (21.4%). Of these, one case was antenatal fetal death due to immune dropsy, and the other 5 cases were early neonatal deaths in newborns.

Group 4 is a group of pregnant women with the most burdened obstetric history (previous births resulted in antenatal fetal death from edema, the birth of children with severe Rh-system HDN as well as the presence of disabled children in the family. 15 women (83.3%) had a history of various reproductive losses. The range of increase in the level of Rh antibodies in pregnant women ranged from 1/16 to 1/512.

All women in this group underwent trans abdominal cordocentesis, and on the basis of hematological and biochemical data revealed hemolytic fetal disease of both edematous and anemic forms. In 5 cases (27.7%), an edematous form of HDN was detected, in 10 cases (55.5%), HDN was anemic in severe form, and in the remaining 3 cases (16.6%), anemic in moderate form of HDN. All pregnant women underwent the operation «Intrauterine intravascular blood transfusion to the fetus». Of these, 3 (16.6%) women had this operation twice. The rate of premature birth in this group was (100 %), that is, all 18 women. Birth in 5 women (27.7 per cent) ended in a natural way. And the other 13 women (72.3%) had operative deliveries.

In this group, cases of perinatal death were observed in 5 newborns (27.7%). Of these, one case was intra-natal fetal death and another was antenatal fetal death due to immune dropsy, and the other 3 cases were early neonatal deaths in newborns.

In statistical processing of data on cerebral blood flow dopplerometry in fetuses, the following analysis was made: in the 1st group of pregnant women, the peak systolic velocity of the middle cerebral artery of fetuses was 53.84 ± 9.11 sm/s; in the 2nd group, this indicator was 56.73 ± 7.28 cm / s; in the 3rd group, 64.26 ± 11.07 sm/s; in the 4th group, 78.21 ± 13.64 cm / s. Analysis of cerebral blood flow showed a significant increase in peak systolic rate (PSR) in the middle cerebral artery (MCA) in fetuses in the 3rd and 4th groups of pregnant women and a significant difference with the 1st and 2nd groups. At the same time, no significant differences were found between the 1st and 2nd groups. It should be noted that in dynamics, the peak speed in the middle cerebral artery of the fetus in the 2nd group increases by a maximum of 1.2 times, in the 3rd group-1.6 times, in the 4th-almost 2 times.

Conclusions

1. A large number of operative deliveries were performed in Rh-immunized pregnant women with a high risk of edematous form of HDN, in group 4, while the lowest number of cesarean sections was performed in Rh-non-immunized women in group 1.

2. When almost any level of Rh-antibody titer is detected in the blood of a Rh-immunized pregnant woman above 22 weeks of age, dopplerometry should be performed to measure the peak systolic rate in the middle cerebral artery for the diagnosis of moderate to severe anemic forms of HDN.

3. A high level of peak systolic velocity of the middle cerebral artery should be an indication for invasive transabdominal cordocentesis and high-tech operation of «intrauterine, intravascular blood transfusion» to the fetus with subsequent premature delivery in perinatal centers of level 3.

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