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Entered 09.01.2020

UDK 616-053.31:618.33

ANTENATAL VALUE RISK FACTORS IN THE FORMATION INTRAUTERINE GROWTH RETARDATION

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Resume

Intrauterine growth retardation is one of the urgent problems of modern medicine worldwide.

Objective: to identify significant antenatal risk factors in the formation of symmetric and asymmetric options for intrauterine growth retardation.

Materials and research methods: to solve the tasks we examined 308 newborns, of which: 235 children with IUGR and 73 practically healthy newborns. In order to study the health status of mothers of the observed newborns, their obstetric and gynecological history, the course of pregnancy and childbirth, a thorough analysis of the history of childbirth was carried out.

Results of the study: we found that the incidence of mothers who gave birth to children with intrauterine growth retardation and development in asphyxia is significantly higher than among mothers who gave birth to children with IUGR without asphyxiation. The presence of broncho-pulmonary and cardiovascular pathologies in mothers increases the risk of having children with intrauterine growth retardation and development in asphyxia by 2–3 times.

Conclusions: among all risk factors in the development of symmetric and asymmetric variants of IUGR, preeclampsia, diseases of the urogenital area in the mother and TORCH infection were of the greatest importance with a clear advantage for the formation of a symmetric variant.

Key words: antenatal factors, maternal pathology, newborn, intrauterine growth retardation.

ЗНАЧЕНИЕ АНТЕНАТАЛЬНЫХ ФАКТОРОВ РИСКА В ФОРМИРОВАНИИ ЗАДЕРЖКИ ВНУТРИУТРОБНОГО РАЗВИТИЯ

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Резюме

Задержка внутриутробного развития является одной из актуальных проблем современной медицины во всем мире.

Цель исследования: выявить значимые антенатальные факторы риска в формировании симметричного и асимметричного вариантов задержки внутриутробного развития.

Материал и методы: для решения поставленных задач нами было обследовано 308 новорожденных, из них: 235 детей с ЗВУР и 73-практически здоровых новорожденных. С целью изучения состояния здоровья матерей наблюдаемых новорожденных, их акушерско-гинекологического анамнеза, течения беременности и родов проведен тщательный анализ историй родов.

Результаты: Нами установлено, что заболеваемость матерей, родивших детей с задержкой внутриутробного роста и развития в асфиксии, достоверно выше, чем среди матерей, родивших детей с ЗВУР без асфиксии. Наличие у матерей бронхо-легочной и сердечно-сосудистой патологии увеличивает риск рождения детей с задержкой внутриутробного роста и развития в асфиксии в 2-3 раза.

Выводы: Среди всех факторов риска в развитии симметричного и асимметричного вариантов ЗВУР наибольшее значение имели преэклампсия, заболевания мочеполовой сферы у матери и TORCH инфекции с явным преимуществом для формирования симметричного варианта.

Ключевые слова: антенатальные факторы, патология матери, новорожденный, задержка внутриутробного развития.

ҲОМИЛА ИЧИ РИВОЖЛАНИШИДАН ОРҚАДА ҚОЛИШНИ РИВОЖЛАНИШИДА АНТЕНАТАЛ ХАВФ ОМИЛЛАРИНИ АҲАМИЯТИ

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Резюме

Дунёда ҳомила ичи ривожланишидан орқада қолиши (ҲРОҚ) замонавий тиббиётнинг ечими топилмаган муаммоларидан бири бўлиб келмоқда.

Тадқиқот мақсади: ҲРОҚнинг симметрик ва асимметрик турини ривожланишида башоратловчи аҳамиятга эга бўлган антенатал хавф омиллари ўрнини аниқлаш.

Материал ва усуллар: тадқиқотнинг мақсад ва вазифаларига мувофиқ текширувлар 308 нафар чақалоқларда ўтказилган, улардан 235 нафари ҳомила ичи ривожланишидан орқада қолган, 73 нафари муддатига етиб тузилган, гестация ёшига мос чақалоқлардир. Текширув гуруҳидаги чақалоқлар оналарининг ўтказган касалликлари, акушер-гинеколог анамнези, ҳомиладорлик ва туғруқ жараёнидаги ўзгаришларни аниқлаш учун туғруқ тарихлари тўлиқ ўрганилди.

Натижалар: тадқиқот давомида ҳомила ичи ривожланишидан орқада қолган, асфиксияда тузилган чақалоқларнинг оналарида, ҳомила ичи ривожланишидан орқада қолган, асфиксия кузатилмаган чақалоқлар оналарига нисбатан касалланиш кўрсаткичининг юқори бўлганлиги аниқланди. Текширув гуруҳи оналаридаги бронх-ўпка ва юрак-қон томир касалликлари чақалоқларни ҳомила ичи ривожланишидан орқада қолиши ва асфиксия ҳолатида туғилиши хавфини 2-3 баробар оширади.

Хулоса: ХРОҚнинг симметрик ва асимметрик турини ривожланишида барча хавф омиллари орасида презклампсия, сийдик таносил касалликлари, ҳомиланинг тушиши, TORCH инфекциялар муҳим ўрин эгаллаган бўлиб, бу омиллар айниқса симметрик тури ривожланишида асосий роль ўйнаган.

Калит сўзлар: антенатал хавф омиллари, оналар патологияси, янги туғилган чақалоқлар, ҳомила ичи ривожланишидан орқада қолиши.

Relevance

The delay in fetal development of the fetus currently remains an urgent problem of modern perinatology, due to the continuing high incidence of morbidity and mortality, the development of chronic pathology and disability of children in perinatal and infancy [1,5,14,16,17].

In the literature you can find a huge number of terms: "uterine growth retardation", "intrauterine growth retardation", "fetal malnutrition", "fetal retardation", "small by gestational age", etc. According to ICD-10, all of the above terms are combined under the concept "Slow growth and lack of nutrition of the fetus" in the rubric P05 [9, 12].

IUGR syndrome is characterized not only by a decrease in weight, but also by a decrease in other parameters of the fetal physical development, signs of morphofunctional immaturity of a number of organs and systems, significantly reduced immunological reactivity and adaptive reserves [1,17,18]. First of all, a rather high frequency of occurrence of IUGR should be noted. Studies by Russian scientists have revealed that newborns with IUGR make up 4.5 to 39% of all newborns with low birth weight at birth [2,12,13,15]. In economically developed countries, the birth rate of children with IUGR is 30-40%, in developing countries it reaches 70% against the background of

a higher birth rate of children with low body weight [12].

The frequency of birth of children with IUGR depends not only on the severity, but also on the duration of the pathological effect on the fetus during pregnancy [5,6,7]. With the combination of chronic pyelonephritis with chronic anemia, mothers significantly increase the number of children born with IUGR. In severe forms of anemia, about 50% of the fetuses are born with signs of intrauterine growth retardation, and 10% of them die in utero. All this leads to hypoxia and a cascade of metabolic and functional disorders in the fetus [5,6,7]. The widespread intrauterine infection, chronic maternal pathology, the use of drugs by pregnant women, bad habits, nutritional deficiencies, poor social conditions determine the growth of this pathology in the world [3,5,10,18]. In 40% of children, it is not possible to identify the cause of IUGR (idiopathic IUGR) [13].

In obstetric practice, IUGR is found in 5-17.6% of all pregnancies, and among stillborn fetuses, 20% have IUGR. The incidence of IUGR in preterm infants is usually higher and, according to some reports, ranges from 4% to 22% [8]. This is because the causes and pathogenetic mechanisms of pathological conditions leading to preterm delivery and IUGR often coincide. The increase in the number of children with IUGR has been especially pronounced over the past 15 years. In

recent years, there has also been a steady increase in the incidence of IUGR in term newborns [3,4,11].

Long-term results of scientific research indicate that IUGR is a multifactorial disease.

Objective: to identify significant antenatal risk factors in the formation of symmetric and asymmetric options for intrauterine growth retardation.

Material and methods

In the present study, in the course of the work, clinical studies of newborns were conducted in the neonatal pathology departments at the 5th City Children's Hospital and the Republican Perinatal Center.

To solve the tasks we examined 308 newborns, of which: 235 children with IUGR and 73 practically healthy newborns without congenital anomalies and hereditary diseases born from practically healthy mothers with a favorable pregnancy and from physiological births. All newborn children with IUGR were divided into 2 groups: the I-main group consisted of 120 newborns with IUGR born in asphyxia, of which 64 were children with a symmetrical shape and 56 children with an asymmetric form of IUGR. The comparison group II included 115 newborns with IUGR who were born without asphyxia: 46 children with a symmetrical form and 69 children with an asymmetric form of IUGR. Newborns with IUGR were included in the study if they had weight and growth characteristics below 10 percentile for the corresponding gestational age.

In order to study the health status of mothers of the observed newborns, their obstetric and gynecological history, the course of pregnancy and childbirth, a thorough analysis of the history of childbirth was carried out (Form No. 98). The results of the data obtained were subjected to statistical processing using the programs developed

in the EXCEL package, using statistical functions, student criterion (t), with the calculation of the probability of error (P). Differences were considered statistically significant at a achieved significance level of $p < 0.05$. For analysis of contingency tables containing information on the frequency of outcomes depending on the presence of a risk factor, the Pearson χ^2 criterion and the odds ratio (OR) (Cornfield J.A. 1951) were used with the calculation of the 95% confidence interval (CI).

Result and discussion

The examined newborns were more often born from mothers with a burdened obstetric history. The average age of mothers of the observed newborns in both groups had no significant differences and amounted to 26.6 ± 0.8 years. There were 43.2% of pre-pregnant women, 26.9% of multiparous women, and 29.9% of multiparous women. We studied the structure of the incidence among mothers who gave birth to newborns with IUGR in asphyxia and among women who gave birth to children with IUGR, but without the presence of asphyxia (Table 1).

The results of our study showed that among all mothers, 1/5 of women suffered from diseases of the respiratory system, among which bronchitis (13.4%), pneumonia (9.2%) and chronic tonsillitis (7.0%) were more common. It was found that, in mothers of the main group, these diseases were found 2.1 times more often than among women in the comparison group.

Among the revealed diseases of the cardiovascular system, hypertension (18.1%) and myocarditis (4.5%) prevailed. Heart defects were identified in isolated cases. The incidence of mothers of the main group of cardiovascular pathology exceeded that in the comparison group by 3 times.

Table 1.
The structure of the incidence of mothers of the observed newborns with intrauterine growth retardation (%).

Diseases	Main group n-120	Comparison group n-115	Total n-235
Respiratory system diseases	25,9±6,0*	12,5±4,5	19,6±3,9
Diseases of the cardiovascular system	18,5±5,3**	6,3±3,1	12,7±3,3

Gastrointestinal diseases	14,8±4,1	10,4±4,4	12,7±3,3
Anemia	68,3±6,3	64,3±6,3	66,4±6,4
Diseases of the genitourinary system	13,0±4,5	10,4±4,4	11,8±3,2
TORCH infection	35,0±6,3	23,5±6,1	29,4±6,2
Acute Respiratory Viral Infection	57,5±6,7	47,0±7,2	52,3±6,8

Note 1: * - significance of differences between groups * $P < 0.05$; ** $P < 0.001$.

A certain part of the chronic pathology was constituted by diseases of the gastrointestinal tract, such as chronic and toxic hepatitis (15.4%), calculous cholecystitis (6.5%). In isolated cases, foodborne toxicoinfection, colitis and gastroenterocolitis were found. In our observations, a certain predominance of the frequency of diseases of the gastrointestinal tract in mothers in the main group relative to the comparison group was revealed.

Among the diseases of the genitourinary system in some mothers, chronic pyelonephritis (12.5%), cystitis (7.0%), adnexitis (6.8%), colpitis (6.8%), glomerulonephritis (3.4%) were identified with no significant differences in the observation groups. An important circumstance was that a third of all the women examined had TORCH complex infections, which were much more common in the main group than in the comparison group.

However, it was noted that the vast majority of mothers of all newborns suffered from anemia with some prevalence among women whose children were born with ASDI in asphyxia.

The importance of studying risk factors for predicting the development of clinical options for intrauterine growth retardation is undeniable. We analyzed the effect of each specific risk factor on the development of IUGR, which was evaluated by the value of the odds ratio, which allows us to

assess the relationship between a specific outcome and a specific risk factor (Tables 2, 3).

Additionally, in each case, the statistical significance of the odds ratio was necessarily evaluated based on the values of the 95% confidence interval. In the course of our work, we analyzed risk factors with a symmetric and asymmetric version, in order to clarify the significance of the influence of individual factors on the development of a particular clinical variant of IUGR.

An analysis of maternal morbidity showed that parasitic viral infections (TORCH) (ICD X P37.8 P39) 4.4 times increased the chance of the formation of a symmetric variant of IUGR (OS = 4.4; 95% CI 1.8 - 10.5; $P < 0.001$). Diseases of the genitourinary system increased the chance of developing a symmetric variant by 7.2 times (OR = 7.2; 95% CI 2.6 - 19.3; $P < 0.001$), and diseases of the cardiovascular system increased the chance of developing a symmetric variant by 3, 8 times (OR = 3.8; 95% CI 1.5 - 9.7; $P < 0.05$).

The presence in the mother's history of spontaneous miscarriages increased the chance of developing a symmetric form of IUGR by 6.5 times (OS = 6.5; 95% CI 2.2 - 19.3; $P < 0.001$). Pregnancy toxicosis increased the chance of developing a symmetric form of IUGR by 2.8 times (OS = 2.8; 95% CI 1.5 - 5.4; $P < 0.001$).

Table 2.

Significance of risk factors in the symmetric version of the IUGR

Risk factor	IUGR symmetric option n-110	Control group n-73	X ²	RCH	95% CI	P
TORCH infection	35	7	12,3	4,4	1,8; 10,5	<0,001
Diseases of the genitourinary system	38	5	18,3	7,2	2,6; 19,3	<0,001
Diseases of the cardiovascular system	28	6	8,6	3,8	1,5; 9,7	<0,05
Spontaneous miscarriages	30	4	13,8	6,5	2,2; 19,3	<0,001
acute respiratory viral infection	61	27	5,9	2,1	1,1; 3,8	<0,05
Anemia	71	36	4,2	1,9	1,0; 3,4	<0,05
Toxicosis	59	21	11,0	2,8	1,5; 5,4	<0,001

The threat of spontaneous miscarriage	42	16	5,4	2,2	1,1; 4,3	<0,05
Preeclampsia	45	3	30,7	16,2	4,7; 54,5	<0,001
Placental abruption	15	4	2,3	2,7	0,9; 8,6	<0,05
Dirty amniotic fluid	23	5	7,9	3,7	1,5; 9,2	<0,001

The presence in the mother's history of spontaneous miscarriages increased the chance of developing a symmetric form of IUGR by 6.5 times (OS = 6.5; 95% CI 2.2 - 19.3; P <0.001). Pregnancy toxicosis increased the chance of developing a symmetric form of IUGR by 2.8 times (OS = 2.8; 95% CI 1.5 - 5.4; P <0.001).

Factors such as the threat of spontaneous miscarriage and SARS also had an impact on the risk of developing a symmetric form of IUGR in 2.2 (OS = 2.2; 95% CI 1.1 to 4.3; P <0.05) and 2.1 times (OR = 2.1; 95% CI 1.1 - 3.8; P <0.05), respectively.

An important circumstance was that preeclampsia increased the chance of developing a symmetric form of IUGR by 16.2 times (OR = 16.2; 95% CI 4.7 - 54.5; P <0.001). The presence of dirty amniotic fluid increased by 3.7 times the risk of a symmetric form of IUGR (OS = 3.7; 95% CI 1.5 - 9.2; P <0.001).

We also analyzed factors that increase the risk of developing an asymmetric form of IUGR (Table 3). When analyzing the incidence of mothers in children with an asymmetric version of TORCH

infection, the chance of forming IUGR was 3.5 times increased (OS = 3.5; 95% CI 1.5 - 8.4; P <0.001).

Diseases of the genitourinary system increased the chance of developing an asymmetric variant by 5.1 times (OS = 5.1; 95% CI 1.9 - 13.7; P <0.001), and diseases of the cardiovascular system by 2.6 times (OS = 2.6; 95% CI 1.0 - 6.8; P <0.05). The presence in the mother's history of anemia increased the chance of developing an asymmetric form of IUGR by 2.2 times (OR = 2.2; 95% CI 1.2 - 3.9; P <0.05).

Similarly, pregnancy toxicosis increased the chance of developing an asymmetric form of IUGR by 2.4 times (OR = 2.4; 95% CI 1.3 - 4.4; P <0.05). Most of all, the chance of developing an asymmetric form of IUGR was increased in the presence of preeclampsia - 12.7 times (OR = 12.7; 95% CI 3.7 - 42.6; P <0.001). It was noteworthy that partial detachment of the placenta increased the risk of developing an asymmetric form of IUGR by 4.7 times (OR = 4.7; 95% CI 1.6-14.2; P <0.001).

Table 3.

The significance of risk factors in the asymmetric version of the IUGR

Risk factor	IUGR asymmetric option n-110	Control group n-73	X ²	RC H	95% CI	P
TORCH infection	34	7	8,7	3,5	1,5; 8,4	<0,001
Diseases of the genitourinary system	34	5	12,1	5,1	1,9; 13,7	<0,001
Diseases of the cardiovascular system	24	6	4,3	2,6	1,0; 6,8	<0,05
Spontaneous miscarriages	14	4	2,2	2,1	0,8; 5,9	
acute respiratory viral infection	62	27	2,9	1,7	0,9; 3,0	
Anemia	85	36	6,8	2,2	1,2; 3,9	
Toxicosis	47	21	7,6	2,4	1,3; 4,4	<0,05
The threat of spontaneous miscarriage	45	16	4,3	2,0	1,0; 3,9	<0,05
Preeclampsia	44	3	22,9	12,7	3,7; 42,6	<0,001
Placental abruption	27	4	9,1	4,7	1,6; 14,2	<0,001
Dirty amniotic fluid	18	5	2,6	2,3	0,8; 6,4	

All analyzed 11 risk factors in newborns with a symmetric variant of IUGR were significantly

significant and increased the chance of developing this variant of IUGR by 2.1 - 16.2 times.

In the group of newborns with an asymmetric variant of IUGR, out of 11 analyzed factors, there were reliably significant 7 factors. They increased the chance of developing an asymmetric variant by 2.0-12.7 times.

We also found that the incidence of mothers who gave birth to children with intrauterine growth retardation and developmental delay in asphyxia is significantly higher than among mothers who gave birth to children with IUGR without asphyxiation. The presence of broncho-pulmonary and cardiovascular pathologies in mothers increases the risk of having children with intrauterine growth retardation and development in asphyxia by 2-3 times.

The most significant risk factors for the formation of the symmetric variant of IUGR are: preeclampsia (OS = 16.2), diseases of the genitourinary system (OS = 7.2), spontaneous miscarriages (OS = 6.5), TORCH infection (OS = 4.4), early toxicosis (OR = 2.8). The most significant risk factors for the development of an asymmetric variant of IUGR are: preeclampsia (OS = 12.7), diseases of the genitourinary system (OS = 5.1), partial detachment of the placenta (OS = 4.7), TORCH infection (OS = 3.5).

Thus, among all risk factors in the development of symmetric and asymmetric variants of IUGR, preeclampsia, diseases of the urogenital sphere in the mother and TORCH infection were of greatest importance with a clear advantage for the formation of a symmetric variant.

The features of the course of the perinatal period in newborns born with intrauterine growth retardation and development that we have identified will allow us to carry out targeted treatment and preventive measures to ensure a favorable course of pregnancy and the birth of healthy newborn children.

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Entered 09.01. 2020

UDC 616.22-008.5.

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