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PARAMETERS OF THE BIOPHYSICAL PROFILE OF THE FETAL IN PREECLAMPSY

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PARAMETERS OF THE BIOPHYSICAL PROFILE OF THE FETAL IN PREECLAMPSY

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Resume

Determining the condition of the intrauterine fetus is an important obstetric and social task. Despite the long-term use of the biophysical profile of the fetus, there are many opinions of its sensitivity and specificity in situations of intrauterine dysfunction. The parameters of BFP in light and severe pre-eclampsia were investigated; sensitivity and specificity of the parameters were studied. The sensitivity of determination of respiratory activity in cases of birth of newborns in serious condition was 86%, specificity 54%. The odds ratios between risk and outcome in the study of the effect of determining fetal respiratory activity revealed differences at 95% OR = 2 (DI 1,24-1,98) in severe preeclampsia. For motor activity - at 95% OR = 2 (DI 1,32- 1.76).

Keywords: preeclampsia, state of newborn, biophysical profile of fetus.

ПАРАМЕТРОВ БИОФИЗИЧЕСКОГО ПРОФИЛЯ ПЛОДА ПРИ ПРЕЭКЛАМПСИИ

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Резюме

Определение состояния внутриутробного плода является важной акушерской и социальной задачей. Несмотря на многолетнее использование биофизического профиля плода, существует много мнений его

чувствительности и специфичности в ситуациях внутриутробного неблагополучия. Исследовали параметры БФПП при преэклампсии легкой и тяжелой степени тяжести, изучали чувствительность и специфичность параметров. Чувствительность определения дыхательной активности в случаях рождения новорожденных в тяжелом состоянии составила 86%, специфичность 54%. Отношения шансов между риском и исходом в изучении влияния определения дыхательной активности плода выявило различия при 95% ОШ=2(ДИ1,24-1,98) при тяжелой преэклампсии. Для двигательной активности- при 95% ОШ=2 (ДИ1,32- 1,76). Данные связали с уровнем гомоцистеина в крови беременных.

Ключевые слова: преэклампсия, состояние новорожденного, биофизический профиль плода, гомоцистеин.

PREEKLAMPSIYA HOLATINI BIOFIZIK PROFILINING PARAMETRLARI

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Rezyume

Intrauterin xomilaning holatini aniqlash muhim akusherlik va ijtimoiy vazifadir. Xomilalik biofizik profilni uzoq muddatli foydalanishga qaramasdan, intrauterin muammolar holatlarida uning sezgirligi va o'ziga xosligi haqida ko'p fikrlar mavjud. Engil va og'ir darajadagi preeklampsiada BFPP parametrlari tekshirildi, parametrlarning sezuvchanligi va o'ziga xosligini o'rganib chiqdi. Og'ir sharoitda tug'ilgan chaqaloqlarda nafas olish faolligini aniqlashning sezuvchanligi 86%, o'ziga xosligi 54% edi. Xomilaning nafas olish faolligini aniqlashning ta'sirini o'rganishda xavf va natijalar o'rtasidagi munosabatlar 95% osh=2(di1,24-1,98) da og'ir preeklampsi bilan farq qildi. Dvigatel faoliyati uchun - 95% osh=2 (Di 1,32-1,76) da.

Kalit so'zlar: preeklampsia, yangi tug'ilgan chaqaloqning holati, xomilaning biofizik profili.

Relevance

Determination of the state of the intrauterine fetus is an important obstetric and social task. In this regard, preeclampsia is one of the most severe complications of pregnancy, which directly affects the intrauterine development of the fetus [3,4,6]. The high rates of perinatal morbidity and mortality in this complication of pregnancy necessitate a search for a study of its condition much earlier than the development of tragic events. In addition, it is important for assessing the main functional parameters of the fetoplacental complex in order to make a timely decision on the methods and timing of delivery of women with preeclampsia [3,5,6,7]. Today we have little opportunity to determine the well-being of an intrauterine patient. Routine clinical diagnostic methods, with their ease of implementation, do not provide sufficient information; therefore, methods of laboratory and instrumental examination of the fetus are becoming more widespread, which allows obtaining more complete information about disorders in the fetoplacental complex [6, 12, 14, 16]. The definition of the biophysical profile of the fetus (BFPP) during echographic examination has become widespread in modern obstetrics [2, 3, 6, 13]. BFPP is a set of parameters of the biophysical activity of the fetus and factors of its habitat.

Foreign researchers have been using BPP in obstetric practice for several decades. However, the accumulated clinical experience has formed an objective and very critical view of the technique from the standpoint of practical use and prognostic value [1,8,14]. Some studies have shown an association between abnormal PPI and perinatal mortality and cerebral palsy [15], while others indicate the absence of this association and have shown a low diagnostic efficacy of the technique against the background of a high rate of false-positive and false-negative results [15]. In a large observational study, the false-negative rate of PPI was 0.8 / 1000, but 60% of abnormal tests were false-positive [17].

Nevertheless, based on the WHO recommendations, the National Guidelines for Antenatal Care support the concept of the need for biophysical testing at a frequency of 2 times a week for high perinatal risk, in particular for prolongation of pregnancy after 42 weeks. We tried to link the data of biophysical activity with the readings of the level of homocysteine, as one of the most important indicators of endothelial dysfunction causing preeclampsia. Homocysteine levels in preeclampsia have been discussed by us in previous publications.

The aim of our study was to investigate changes in PPI parameters in preeclampsia, and to find parallels with changes in homocysteine levels.

Material and methods

127 pregnant women were examined. The control group included pregnant women without signs of PE, without extragenital pathology (n = 42). The main group included patients with signs of preeclampsia (n = 85), and according to their clinical symptoms, they were divided into groups with mild (n = 50) and severe (n = 35) forms of preeclampsia. The study was carried out in the period of 34-40 weeks. Evaluation of the degree of preeclampsia, general clinical diagnostic, functional studies, treatment, and assistance were carried out in accordance with the protocol of the National Guidelines for the Management of Pregnant Women with Preeclampsia. Ultrasound scanning was carried out on the device "ALOKA-630" (Japan) operating in real time, using a sector mechanical sensor 3 MHz in conjunction with an ultrasound specialist doctor of the Highest category. The following parameters of the biophysical profile of the fetus were evaluated according to the scale of AM Vintzeleos et al. (1983): respiratory movements of the fetus, movement, extension and flexion (fetal tone), the amount of amniotic fluid, non-stress test, the degree of maturity of the placenta [14]. Each BFPP parameter was assessed in points: 0-2 points. In order to standardize the conditions, the BFPP was assessed at the same time (11-13 hours) 2 hours after a meal. The BFPP score of 8-10 points characterizes the normal state of the fetus; 4-6 points - compensated; 0-2 points - pathological condition [13,14]

The analysis of the BFPP results was carried out with the study of the main parameters, the sensitivity and specificity of the determination of these markers were determined. The calculation of indicators was carried out using the PPP "Microsoft Excel 2010" and (PPP) "Statistica for Windows 6.0". The odds ratio of risk and outcome of FFP parameters in mild to severe preeclampsia and confidence intervals were calculated. One episode of respiratory activity lasting more than 60 seconds in 30 minutes of observation was rated as 2 points. With the duration of the episode of fetal respiratory activity from 30 to 60 seconds, this sign was estimated at 1 point. The absence of episodes of fetal respiratory activity or their duration less than 30 seconds in 30 minutes of observation was regarded as 0 points.

The criterion for normal fetal motor activity was the presence of three or more movements of the trunk and limbs during 30 minutes of observation. Normal fetal tone is considered while maintaining the ability to flex and extend the limbs, while the spine should be in a position of full flexion. Fetal atony was suggested by visualizing full extension (open hand) with complete absence of fetal movement.

The amount of amniotic fluid was assessed by measuring the amniotic fluid index. The amniotic fluid index was determined as the sum of the vertical dimensions of the largest pockets of amniotic fluid in each of the four quadrants of the uterus. The measurements were carried out with the longitudinal position of the transducer; the dimensions of each quadrant, free from the umbilical cord loops and small parts of the fetus, were summarized [1]. The non-stress test was performed according to the rules of antenatal cardiotocography. The number of accelerations that occurred during 20 minutes of recording the fetal heart rate was taken as a criterion for the state of the fetus. The survey did not include pregnant women with infectious and inflammatory diseases, mental disorders of the central nervous system and other concomitant extragenital pathology. All women were informed about the research procedures and agreed with the examination.

The level of homocysteine in pregnant women with preeclampsia was studied by ELISA and compared with the parameters of the biophysical activity of the fetus.

Result and discussion

The age of pregnant women in different groups did not differ significantly and amounted to 25 ± 1.65. All pregnancies were singleton. In the control group, 83.3% (n = 35) of pregnant women were primiparous, 16.7% (n = 7) were multiparous. In the group with mild preeclampsia, there were more primiparous 80% (n = 40), and in the group with severe preeclampsia, there were more multiparous - 71.4% (n = 25).

Ultrasound examination of pregnant women and their fetuses revealed that the syndrome of limited fetal growth in the group with severe preeclampsia was detected in 65% (23) of cases.

The results of ultrasound scanning of the groups examined showed that the greatest changes in the placenta were observed in pregnant women with severe preeclampsia, in particular in 91% -97% of cases, in the form of thickening of the placental tissue, the formation of calcification (Table 1).

Table 1. Ultrasound characteristics of the placenta in the examined.

	Examined / **Ultrasound options**	**Control N=42**	**Mild preeclampsia N=50**	**Heavy N=35**
1	Placental tissue thickness	38±0,52	42±0,33	46±0,76
2	Premature "aging" of the placenta	2(4,7%)	40(80%)	32(91%)
3	Placental tissue calcification	0	25(50%)	34(97,4%)
4	Inclusions in amniotic fluid	10(23,8%)	25(50%)	28(80%)
5	Malnutrition	2(4,7%)	8(16%)	18(51,4%)
6	Polyhydramnios	3(7,1%)	4((8%)	4(11,4%)

$p<0,05$

When assessing the biophysical activity of the fetus, in 85% of cases, a significant decrease in respiratory activity was revealed in preeclampsia in comparison with mild and in the control groups, 7.1% (3) and 20% (10) cases, respectively. “Lack of breathing” of 2 points was noted in fetuses of women with severe preeclampsia. Motor activity was detected in all fetuses of the control group. And it was estimated at 2 points in severe preeclampsia in a third of the fetuses (28.5% (10)). Respiratory activity of 1 point was noted in 15% of fetuses, while motor activity was noted in half with severe preeclampsia. The sensitivity of determining the respiratory activity in cases of newborn birth in a serious condition was 86%, the specificity was 64%. The odds ratio between risk and outcome in the study of the effect of determining the respiratory activity of the fetus revealed differences at 95% OR = 2 (CI 1.24-1.98) in severe preeclampsia. For physical activity, at 95% OR = 2 (CI 1.32-1.76). The absence of heart rate reactivity was more marked in cases of severe preeclampsia, 71.5% (25), where the areactive test was found 2.5 times less in pregnant women with mild preeclampsia, and in all of them reactivity was noted in pregnant women with physiological pregnancy. Highly specific parameters of BFPP in the diagnosis of PN were: NBT - 98.7%, DDP - 93.1%. Low water was detected in half of pregnant women with severe PE, and this had a positive strong correlation with the lack of respiratory activity in the fetus (r = 0.87). Our studies have shown a strong correlation with the level of homocysteine-28 mmol / l in mild preeclampsia - with impaired respiratory activity in the fetus (r = 0.76) and 36.7 mmol / l in severe preeclampsia (r = 0.82).

Table No. 2 Changes in the parameters of the biophysical profile of the fetus in the surveyed.

	Fetal biophysical profile parameters	**Control N=42**			**Mild preeclampsia N=50**			**Heavy N=35**		
	Points	0	1	2	0	1	2	0	1	2

1.	Physical activity	-	-	42 (100%)	2 (4%)	22 (44%)	26 (52%)	5 (14%)	20 (57,1%)	10 (28,5%)
2.	Respiratory movements	3 (7,1%)	-	39 (92%)	10 (20%)	25 (50%)	15 (30%)	30 (85%)	5 (15%)	0
3.	Fetal muscle tone	-	-	42 (100%)	3 (6%)	27 (54%)	20 (40%)	10 (28,5%)	15 (42,8%)	10 (28,5%)
4.	Amniotic fluid									
	norm	37 (88%)			33 (66%)			13 (37,1%)		
	lack of water	2 (4,7%)			11 22%)			18 (51,4%)		
	polyhydramnios	3 (7,1%)			6 (12%)			4 (11,4%)		
5.	Cardiotocography									
	reactive	42 (100%)			38 (76%)			10 (28,5%)		
	not reactive	0			12 (24%)			25 (71,5%)		

Conclusions

More than half a century of experience in using the assessment of the state of the biophysical activity of an intrauterine fetus demonstrates the lack of accurate indicators of intrauterine suffering. In our work, we tried to determine the most sensitive parameter indicating the lack of well-being of an intrauterine patient with preeclampsia and to associate it with homocysteine.

Practical experience of using the method shows that the assessment of muscle tone and different types of fetal movements is to one degree or another subject not only to objective factors, but also to the subjectivity of the researcher. The disadvantages of the method include its high economic cost due to the regulated 30-minute monitoring time. In addition, the presence of fetal sleep episodes as an important factor in the fetal behavioral model actually requires an even more significant investment of time and other factors that have a direct impact on the PPI parameters [10], complicate the

interpretation and reduce the diagnostic value of the technique. From our point of view, the high specificity and sensitivity of determining respiratory activity during fetal suffering may be due to the fact that the formation of a center for the regulation of respiratory activity occurs much later than the formation of other centers for the regulation of biophysical functions, as a younger area, and therefore, more vulnerable with a lack of oxygenation of the fetus. Our studies have shown the presence of an increased level of homocysteine in the blood in pregnant women in the group with preeclampsia and a close relationship with the lack of respiratory activity in the BPP. In this regard, the determination of PPI, together with the level of homocysteine in pregnant women with preeclampsia, can be markers of intrauterine fetal dysfunction and contribute to rational tactics of pregnancy management in the interests of the fetus in preeclampsia.

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