ADAPTATION CHARACTERISTICS OF PREMATURE INFANTS BORNTO EARLY PREECLAMPTIC MOTHERS

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ADAPTATION CHARACTERISTICS OF PREMATURE INFANTS BORNTO EARLY PREECLAMPTIC MOTHERS

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Tashkent Pediatric Medical Institute

Abstract

Background. Preeclampsia is the most serious pregnancy complication that poses a threat of the mother’s and baby’s life. In almost all cases, due to a disorder of the function of vital organs - the brain, liver, lungs, kidneys - multiple organ failure develops and progresses. Adaptation of newborns in the early neonatal period depends on the functions of the mother-fetus system. We aimed to to study the features of the period of early adaptation in preterm infants born to women with preeclampsia.

Methods. The study involved 40 preterm infants who were divided into 2 groups: of which 20 preterm infants born to mothers with preeclampsia (group I - main) and 20 full-term babies from mothers without preeclampsia (group II - comparative) born in the same period. Obstetric history of mothers, examined newborns, Apgar score, clinical - laboratory and instrumental studies were examined.

Results. The parity of childbirth in the group of women with preeclampsia was 2.25 ± 0.8 and 1.7 ± 0.53 in the control group. Among the identified complications of pregnancy in women with preeclampsia, FPF is at the first place in 80% (n = 16) of mothers, at the second - anemia 70% (n = 14), at the third - the threat of termination in 55% (n = 11) of women, fourth - gestosis in 35% (n = 7), SARS 25% (n = 5) were detected to a lesser extent.

Conclusion. High risk factors for the development of perinatal pathology and maladaptation syndrome in premature infants are the presence of a burdened obstetric history in women, as well as preeclampsia, fetoplacental insufficiency, and birth asphyxiation.

Key words: preterm infants, maternal preeclampsia, asphyxia, adaptation, neonatal period.

BACKGROUND

Preeclampsia has long been a leading cause of maternal and fetal/infant morbidity and mortality, as well as adverse perinatal outcomes (Arzhanova, 2010; and Savelyeva et al, 2010). Moreover, most authors note an increase in severe forms of preeclampsia (Savelyeva et al, 2010; and Sidorova et al, 2009). Perinatal mortality in this complication of pregnancy can reach up to 30%, and perinatal morbidity - 80%. Preeclampsia is the most serious pregnancy complication that poses a threat of the mother’s and baby’s life. In almost all cases, due to a disorder of the function of vital organs - the brain, liver, lungs, kidneys -
multiple organ failure develops and progresses. The consequences of the past complications are manifested not only in the early postpartum period, but also in the subsequent years of a woman's life.

Maternal preeclampsia leads to impaired growth and development of the fetus, the birth of premature babies, the formation of perinatal lesions of a hypoxic nature, primarily the central nervous, cardiovascular, endocrine, immune, respiratory and other systems. This negatively affects the health status of children in subsequent years of life (Perceva et al, 2011; and Yakornova, 2006).

Adaptation of newborns in the early neonatal period, primarily depends on the adequacy of the functioning of the mother-fetus system, which is impaired with various complications of pregnancy (Makarov et al, 2009; Sidorova et al, 2009; and Yakornova, 2006).

The frequency of fetoplacental failure (FPF) with preeclampsia is from 30.3 to 60% and is the main cause of intrauterine hypoxia, intrauterine growth retardation syndrome, causing a high incidence of newborns. In children who have undergone chronic intrauterine hypoxia (with circulatory disorders in the placenta), the development of asphyxiation at birth is possible (Yakornova, 2006). In this regard, preeclampsia (PE) is one of the most common causes of neonatal adaptation disorders in the neonatal period, the cause of high perinatal and infant morbidity and mortality, and is one of the urgent issues of neonatology.

**PURPOSE OF THE STUDY**

To study the features of the period of early adaptation of premature newborn babies born from women with preeclampsia.

**MATERIAL AND METHODS**

The study involved 40 preterm infants who were divided into 2 groups: of which 20 preterm infants born from mothers with preeclampsia (group I - main) and 20 full-term babies from mothers without preeclampsia (group II - control) born in the same period.

The analysis of obstetric history of mothers, examined newborns, Apgar score, clinical, laboratory and instrumental studies.

**RESULTS**

As the results of the study showed, when studying the anamnesis, the average age of women with preeclampsia was $28.6 \pm 5.9$ years, in the comparison group it was $26.6 \pm 5.3$ years. When studying pregnancy parity, it was found that in the main group it was $2.9 \pm 2.1$ and $1.95 \pm 1.5$ in the second. The parity of childbirth in the group of women with preeclampsia was $2.25 \pm 0.8$ and $1.7 \pm 0.53$ in the control group (Table 1).
Table 1.
Common characteristics of women gave birth prematurely, by age and parity of pregnancy and childbirth

<table>
<thead>
<tr>
<th>Values</th>
<th>Main group n=20</th>
<th>Control group n=20</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>28,6±5,9</td>
<td>26,6± 5,3</td>
<td>&gt;0,05</td>
</tr>
<tr>
<td>Parity of pregnancy</td>
<td>2,9±2,1</td>
<td>1,95±1,5</td>
<td>&gt;0,05</td>
</tr>
<tr>
<td>Parity of childbirth</td>
<td>2,25±0,8</td>
<td>1,7±0,53</td>
<td>&gt;0,05</td>
</tr>
</tbody>
</table>

P - the degree of significance of differences between the indicators of the compared groups.

There was a tendency to increase the age of women with preeclampsia, however, no significant age differences were found, and there were no significant differences in the parity of pregnancy and childbirth.

Fig. 1. The frequency of complications during pregnancy in mothers of the examined newborn children.

According to the frequency of occurrence, among the identified complications of pregnancy in women with preeclampsia, fetoplacental insufficiency (FPF) is at the first place in 80% (n = 16) of mothers, at the second - anemia 70% (n = 14), at the third - the threat of termination in 55% (n = 11) of women, fourth - gestosis in 35% (n = 7), SARS 25% (n = 5) were detected to a lesser extent (Fig. 1). In the control group: the leading place is occupied by anemia of 30% (n = 6) and the threatening miscarriage in 30% (n = 6), then SARS in 20% (n = 4), only at third place is an FPF of 15% (n = 3) and gestosis 15% (n = 3).
Fig. 2. Doppler study of hemodynamics in the system of "mother-placenta-fetus" in the pregnant women.

It was noted that the incidence of pregnancy complications varied significantly, so placental insufficiency reached significantly maximum values in the main group (p <0.001), and anemia was significantly more common in the comparison group (p <0.01).

In dopplerometry of women with preeclampsia, hemodynamic disturbances of 2nd and 3rd degrees were dominated in 45% (9) and 40% (8) of mothers, respectively. The number of women with FPF-1 degree was 3 times less and amounted to 15% (3). In the comparison group, hemodynamic disturbances 1 degree to 10% (2) women and 2nd degree in a single case 5% (1) were more often detected (Table 2).

Table 3. The method of delivery of women

<table>
<thead>
<tr>
<th>DeliveryMethod</th>
<th>Main group</th>
<th>Control group</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abs</td>
<td>%</td>
<td>Abs</td>
</tr>
<tr>
<td>All women</td>
<td>20</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>Cesareansection</td>
<td>16</td>
<td>80</td>
<td>2</td>
</tr>
<tr>
<td>Independentbirth</td>
<td>4</td>
<td>20</td>
<td>18</td>
</tr>
</tbody>
</table>

P - the degree of significance of differences between the indicators of the compared groups.

The method of delivery in all women depended on various factors and was primarily determined by the gestational age, obstetric situation, extragenital pathology, the severity of preeclampsia and the severity of fetal hypoxia. Thus, in the main group, 80% (16) of women were delivered by surgery, and in the comparison group only 10%. (Table 3). In the main group, surgical delivery of women was performed more often than in the comparison group. Delivery by cesarean section leads to a decrease in perinatal mortality and slightly
contributes to a decrease in the incidence of premature babies.

In our studies, the main group included preterm infants with gestational age from 29 to 36 weeks. Their average gestational age was 30.7 ± 2.2 weeks. The comparison group included children with a gestational age of 37-41 weeks, and the average value of their gestational age was 34 ± 1.66 weeks. The body weight of newborns in the main group averaged 1584 ± 511.5 g, and in the comparison group 3390.2 ± 463.3 g (Table 4).

From the presented physical parameters of newborns (Table 4), it is seen that newborn babies born to women with preeclampsia were characterized by a lower body weight, which was 1584.8 ± 511.5 g, against 3390.2 ± 463.3 g in comparison. The same pattern was observed with respect to the body length of the newborn - 38.5 ± 3.48 cm versus 53.82 ± 2.21 cm, as well as the circumferences of the head and chest of the newborn 28.6 ± 2.14 cm and 26.25 ± 2.68 cm versus 34.52 ± 1.11 cm and 33.66 ± 1.35 cm, respectively.

<table>
<thead>
<tr>
<th>The condition of the newborn in women with severe preeclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Values</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Body mass, gr</td>
</tr>
<tr>
<td>Body length, cm</td>
</tr>
<tr>
<td>Head roundness, cm</td>
</tr>
<tr>
<td>Chest roundness, cm</td>
</tr>
<tr>
<td>Evaluation by Apgar scale, 1st minute, ball</td>
</tr>
<tr>
<td>Evaluation by Apgar scale, 5th minute, ball</td>
</tr>
</tbody>
</table>

Significant differences were detected by gestational age and weight (≤0.05), however, it was noted that premature babies born to women with preeclampsia had lower physical development and constituted a group of small ones by gestational age (ICD 10 codes).

A complete clinical examination was carried out for all newborns, including an assessment of the condition of the child at birth and in dynamics.

Assessment of the condition of the newborn child primarily reflects its viability and the ability to adapt to the external environment during the first 7 days of life.

Using the Apgar scale, the severity of the condition of newborns at birth was assessed. The assessment was made in the first and fifth minutes after birth by summing the scores of each trait. The main task of the Apgar assessment is to determine the presence of asphyxia in the child and its severity. The Apgar score 1 minute after birth, equal to 4-7 points, corresponds to moderate and moderate asphyxiation. A diagnosis of severe asphyxia is valid if the...
Apgar score is 1-3 points. The Apgar score 5 minutes after birth is not so much diagnostic as prognostic and reflects the effectiveness of resuscitation measures.

In the state of asphyxia, 85% of premature infants were born from women with preeclampsia in the comparison group of 10%. Of these, 35% of the newborns of the main group were born in a state of severe asphyxia, in the comparison group such children were not observed. According to the data obtained, the number of newborns with moderate to severe asphyxia at birth was 50% in the main group and the comparison group 10%. Without asphyxiation, i.e. with an Apgar score of 8–9, 90% of the children in the comparison group were born. The average Apgar score for newborns in the first minute in the group with preeclampsia was 6.55 ± 0.80 points, and in the control group it was significantly higher - 7.5 ± 0.80 points. At the fifth minute, there was also a lower Apgar score in newborns of the first group in relation to the control - 7.85 ± 0.53 points and 8.5 ± 0.80 points.

**DISCUSSIONS**

Thus, fetoplacental insufficiency (FPF) is the most frequent complication of pregnancy in women with preeclampsia in 100% of cases and significantly differs from the comparison group (p <0.001). The third degree (critical) was found only in fruits in the main group (p <0.001). In the state of asphyxia, significantly more preterm infants were born from women with preeclampsia (p <0.001), severe asphyxia at birth was observed only in children in the main group. The average severity of asphyxia did not differ significantly, while newborns without asphyxia, i.e. with an Apgar score of 8-9, significantly more were born in the comparison group. High risk factors for the development of perinatal pathology and maladaptation syndrome in premature infants include the presence of a burdened obstetric history in women, as well as pre-eclampsia, fetoplacental insufficiency, and birth asphyxia.

A cross-sectional study including neonates of mothers with (n = 48) and those without pre-eclampsia (control group) (n = 72) was conducted (Bujold et al, 2003). Neonates born to mothers with pre-eclampsia had a significantly higher percentage of natural killer cells than those in the control group (pre-eclampsia, mean +/- SD 17 +/- 9% vs. control, mean +/- SD 12 +/- 7.5%; p = 0.001). Multiple regression analysis suggested that umbilical cord blood pH of <7.2, labor with vaginal delivery and maternal pre-eclampsia were associated with an increased percentage of natural killer cells in umbilical cord blood.

Pre-eclampsia can lead to premature birth and even death of the child. In some cases, this may cause feelings of guilt in mothers (Kidner et al, 2004). This is line with our findings; anyway after some reflection, the mothers realised they could not blame themselves. Moreover, the mothers mourned that the plans they had made while anticipating giving birth to a full-term infant could not be fulfilled. Women suffering from pre-eclampsia
experienced the condition as being so serious it caused them to recognise the seriousness of the illness and death as a possibility for both for themselves and their infants (Souza et al, 2007).

The life-threatening illness influenced the mothers mentally, as well as physical. The time around birth was characterised by the appalling symptoms, feeling of fear, being out of control and separation. Afterwards, the mothers in study all reflected on existential issues, even those who were observed in the maternity ward prior to birth. Some felt their infants had a hard start to life and were afraid of bonding, in case the infant should die. Their perspective of life and death was changed. Suffering from preeclampsia can be a devastating experience, especially when premature birth is necessary (Vaerland et al, 2018).

CONCLUSION
Premature infants from women with pre-eclampsia must undergo a thorough clinical and laboratory examination and organization the basis of common principles, including measures to create sparing conditions for early adaptation.

STUDY LIMITATIONS
The study is missing a sample size calculation and the number of participants to prove the hypothesis might be less than it supposed to be. Thus, further researches may be required with an adequate sample size and with control groups to show more clear and exact results.

ACKNOWLEDGEMENTS
We are grateful to the staff members of the Clinic of Tashkent Pediatric Medical Institute and Republic Screening Centre for the cooperation and support in our research. The parents of the participants kindly gave full written permission for this report.

ETHICAL APPROVAL
The ethical approval for the study was granted by the Committee of Ethical Approval for Researches under the Ministry of Health of the Republic of Uzbekistan.

CONSENT
Written informed consent was obtained from all participants of the research for publication of this paper and any accompanying information related to this study. A copy of the written consent is available for review by the authors.

CONFLICT OF INTEREST
The authors declare that they have no competing interests.

FUNDING
No funding sources to declare.

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