ORIGINAL ARTICLE

The Condition of the Newborn after the Premature Operative Delivery due to Premature Detachment of the Placenta, without Prior Rupture of Fetal Membranes

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ABSTRACT

Aim: The placenta in preterm labor is the reason of perinatal losses and high morbidity of newborns. Therefore, the optimal tactics of the management of labor and delivery are a fundamental component condition of the newborn. While amniotomy as a factor stabilizing the detachment of the placenta, and at the same time leading to impaired placental blood flow is a subject of debate in its feasibility. In context, the goal was determined the status of the newborn in preterm operative delivery, PONCH, and pre-amniotomy or her absence before the operation. **Material and Methods:** Retrospective cohort study of clinical cases of progressive detachment of normally situated placenta during preterm birth with the operational ends at the city perinatal center. The inclusion criteria in the study were premature labor, live fetus, a fetal bladder, the diagnosis of progressive PONCH, and stable condition of the mother. Exclusion criteria were signs of fetal infitsirovanija, the scar on the uterus, and the aggravation chronical infection during this pregnancy. Studied two groups of women with progressing PONCH and operational completion of preterm birth without amniotomy (Group A, $n = 50$) and after pre-amniotomy (Group B, $n = 50$). **Conclusion:** The study established that lack of amniotomy, the operational delivery leads to a significant reduction in the frequency of intraventricular hemorrhage of the newborn and reduces blood loss as a result of cesarean section.

Key words: Amniotomy, intraventricular hemorrhage, prematurity, progressive detachment of the placenta

INTRODUCTION

Premature detachment of the normally located placenta (PPRP) refers to urgent complications of pregnancy.[1] Its frequency is 0.22% of 1.57 million births,[2] 0.35% of more than 250,000 births,[3,4] and 1% of nearly 28 million births.[5] It occurs with the same probability in both preterm and full-term pregnancies.[3,6]

Perinatal mortality associated with PPRP reaches 119/1000 live and dead births, compared to 8/1000 live and dead births in the population, and is more common in preterm pregnancy.[1,7] One of the most frequent complications of the early adaptation period of premature newborns (PRANN), intrauterine fetal hypoxia. The before, there is a need to determine the feasibility of amniotomy for fetal outcomes in progressive PPRP during preterm birth, followed by their surgical completion.[3,8] The aim of the study was to determine the possible effect of amniotomy in progressive PPRP during preterm birth, which ended with cesarean section, on the condition of newborns.

MATERIALS AND METHODS

A retrospective cohort study of clinical cases of progressive detachment of the normally located placenta that occurred

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during preterm birth with its prompt completion at the city perinatal center was conducted. Criteria for inclusion in the study were premature operative delivery, live fetus, whole fetal bladder, diagnosis progressive PPRP, and stable condition of the mother. The exclusion criteria were signs of intrauterine infection and the presence of foci of chronic infection or their exacerbation during a real pregnancy, the presence of a scar on the uterus, and placenta previa. At the first and second stages of the study, amniotomy before cesarean section was performed and not performed, respectively. Then, using a random number table, two samples were made of 50 cases from the total of each stage. Of these, two groups of women in labor were formed with progressive PPRP and operative completion of preterm labor in the entire fetal bladder (Group A, $n = 50$) and after preliminary amniotomy (Group B, $n = 50$).

The diagnosis of progressive PPRP was established based on the clinical picture of the disease (pain syndrome, external bleeding, hypertonicity, and uterine tenderness) and ultrasound data (retroplacental hematoma) during cesarean section. The opening of the cervix immediately before cesarean section was, on average, 4.7 ± 1.3 cm in both groups, with a swing of 3–6 cm. The end point of the study was the presence or absence of periventricular and intraventricular hemorrhages in the period of early adaptation of newborns, the detection of which was carried out by ultrasound, in accordance with the current clinical recommendations. The diagnosis of progressive PPRP was established based on the clinical picture of the disease (pain syndrome, external bleeding, hypertonicity, and uterine tenderness) and ultrasound data (retroplacental hematoma). The opening of the cervix immediately before cesarean section was, on average, 4.7 ± 1.3 cm in both groups, with a swing of 3–6 cm. The end point of the study was the presence or absence of periventricular and intraventricular hemorrhages in the period of early adaptation of newborns, the detection of which was carried out by ultrasound, in accordance with current clinical recommendations.

The gestation period for women in Group A ranged from 29 to 34 weeks, on average 30.9 ± 1.7 weeks, in Group B – from 30 to 35 weeks, on average 31.1 ± 1.3 weeks (Student's criterion $t = -0.093$, $P = 0.926$). There were 33 firstborns in Group A and 36 in Group B (Fisher's exact criterion, $P = 0.666$). A history of abortions was found in 38 in Group A and 32 in Group B (Fisher's exact criterion, $P = 0.275$). Preeclampsia and chronic hypertension were observed in 9 in Group A and 11 in Group B (Fisher's exact criterion, $P = 0.611$), Grade I fetal growth retardation in 8 in Group A and 6 in Group B (Fisher's exact criterion, $P = 0.774$), Grade II fetal growth retardation in 1 in Group B and none in Group A, and twins in 2 in Group A and 1 in Group B (exact Fisher's criterion, $P = 1.000$). Polyhydramnios was observed in 5 in Group A and 8 in Group B (Fisher's exact criterion, $P = 0.554$). Six women in Group A and five women in Group B smoked during pregnancy (Fisher's exact criterion, $P = 1.000$). Anemia of pregnant women was found in 36 in Group A and 29 in Group B (Fisher's exact criterion, $P = 0.209$), chronic pyelonephritis – in 12 in Group A and 10 in Group B (Fisher's exact criterion, $P = 0.810$). The threat of termination of a real pregnancy occurred in 16 in Group A and 14 in Group B (Fisher's exact criterion, $P = 0.828$). In general, the groups were comparable for the specified parameters.

The length of time from the moment of this diagnosis to the beginning of operative delivery averaged 31 ± 10.1 min in Group A and 30 ± 11.6 min in Group B (Student's criterion $t = -0.065$, $P = 0.949$) and had no statistically significant differences.

Laboratory control of the hemostasis system before cesarean section and before abdominal suturing was performed using a coagulogram, and operative control of blood clotting was performed using a Lee-White sample. The results of the last one before cesarean section were 7.3 ± 0.5 min in Group A and 8.1 ± 0.6 minutes in Group B (Student's criterion $t = 1.024$, $P = 0.308$) and before abdominal suturing −8.1 ± 0.7 in Group A and 8.9 ± 0.9 in Group B (Student's criterion $t = -0.702$, $P = 0.485$) and were comparable in both groups. Prevention of coagulopathic bleeding was achieved by introducing a saline solution with 1000 mg of tranexamic acid into the vein before cesarean section and by infusing frozen plasva (SPP) at the rate of 10–15 ml/kg with paraclinic signs of hypocoagulation. Due to the presence of hemorrhages in the uterine muscle, which were of a draining nature, two women in labor in Group A and four in Group B (exact minutes in Group B) (Student's criterion $t = 1.024$, $P = 0.308$) and before abdominal suturing −8.1 ± 0.7 in Group A and 8.9 ± 0.9 in Group B (Student's criterion $t = -0.702$, $P = 0.485$) were comparable in both groups. Due to the presence of hemorrhages in the uterine muscle, which were of a draining nature, two women in labor in Group A and four in Group B (exact ovarian arteries on both sides) were performed. Intraoperative blood loss measured by the gravimetric method averaged 150 ± 42.8 ml in Group A and 257.5 ± 64.4 ml in Group B (Student's criterion $P = 0.003$), and differences in its magnitude were statistically significant.

Fetal health was assessed by dopplerometry of the blood flow rate in the uterine and umbilical arteries, calculating the resistance index, or determining patterns of zero or reverse end-diastolic blood flow. Violation of the uteroplacental blood flow of the I degree occurred in 6 in Group A and 2 in Group B (Fisher's exact criterion, $P = 0.269$), II degree – in 2 in Group A and 4 in Group B (Fisher's exact criterion, $P = 0.678$). By this pathological cardiotocogram in childbirth, before cesarean section according to the FIGO classification of 2015 was

followed by 21 in Group A and 25 in Group B (the exact Fisher criterion, $P = 0.547$). Was the average birth weight of 1019 ± 180 g in Group A and 1158 ± 198 g in Group B (student test t = −0.519, P = 0.605) and the average evaluation on a scale Apgar in the 1st min of life of 5.6 ± 0.7 points in Group A and 5.9 ± 0.8 points (student test t = 0.282, $P = 0.779$): 1-3 points - 8 foetus from group A and 9 foetus from group B (Fisher's exact test, $P = 1.000$), 4–5 points – 16 foetus from group A and 18 foetus from group B (Fisher's exact test, $P = 0.833$), 6–8 points 26 foetus from group A and 23 foetus from group B (Fisher's exact test, $P = 0.689$). In general, these parameters of the fetal state in the study groups did not have statistically significant differences.

Operative delivery was carried out using standard techniques laparotomy and cesarean section that was comparable in both groups: Laparotomy Nizhneserginsky, by Pfannenstiel and Joel-Cohen held, respectively, at 15, 26, and 9 in Group A and in 12, 24, and 14 in Group B (Pearson's Chi-square = 1.500, R = 0.472); vertical and transverse sections of the lower segment were held, respectively, 12 and 38 in Group A and in 16 and 34 in Group B (Fisher's exact test, $P = 0.504$).

Statistical processing of the results of the study was carried out in the program "Biostatistics" using the Student's criteria *t*, Pearson Chi-square, and Fisher's exact criterion.

RESULTS AND DISCUSSION

With progressive detachment of the normally located placenta after premature surgical delivery of mothers, periventricular and intraventricular hemorrhages of varying severity were detected in 4 (8%) newborns in Group A and in 42 (84%) newborns in Group B (Fisher's exact criterion, $P = 0.000$). Thus, there was a 10-fold difference between the groups in the effect of reducing the volume of the placenta immediately before cesarean section in mothers with premature fetuses on the frequency of such a complication of the newborn period as intracranial hemorrhage. It should be emphasized that the possible implementation of the vast majority of known factors predisposing to PPRP[3] was balanced between the study groups. The study groups were comparable in age, pregnancy and delivery parity, the degree of immaturity of newborns (gestational age), the frequency of preeclampsia and chronic arterial hypertension, fetal growth retardation, multiple births, polyhydramnios, cigarette smoking, anemia, and chronic pyelonephritis. Abnormalities of the umbilical cord vessels, cocaine use, uterine fibroids, placental abruption during a previous pregnancy, chorioamnionitis, uterine trauma, allergic reactions, short umbilical cord, and external-internal rotation were not registered.

Despite the above comparison of the study groups in accordance with the classification of PPRP by severity for the fetus, in no case did severe hypoxia occur on the Apgar scale. Taking into account the fact that, the frequency of intrauterine fetal death in PPRD decreased from 0.12% in 1989 to 0.05% in 2015. Based on improved prenatal monitoring and availability of emergency transportation,[3] it is possible to recognize the timeliness of obstetric care for mothers with PPRD as one of the reasons for reducing perinatal losses. In addition, in recent years, prevention of coagulopathy (infusion of tranexamic and SPP) has been carried out.

It is impossible to exclude the possibility of an increase in the frequency of intracranial hemorrhages in premature newborns of fetal-maternal bleeding, which occurs in PPRP.[9] However, fetal cells in the mother's peripheral bloodstream are identified only in 4%, and the volume of blood loss in the fetus is maximum 10–12 ml,[3] which is not comparable with the received frequency of intracranial hemorrhages in premature newborns. Therefore, fetal blood loss can only be an additional factor in the development of this complication.

Blood loss in women in labor with progressive PPRP before cesarean section was 310 ± 48 ml in Group A and 150 ± 42 ml in Group B (Student's criterion $t = 2.038$, $P = 0.044$) and was significantly less in Group B.

With PPRP, an increase in the basal tone of the uterus is always determined by 2–4 times, so with extensive placental abruption, childbirth becomes rapid. If initially, the intrauterine pressure is about 50 mmHg against the background of PPRP with the development of labor activity exceeds 100 mm RT. However, there is no shortening of the first and second delivery periods. It follows that hypertonic uterine dysfunction occurred in all the studied cases. With the entire fetal bladder, this increase in intrauterine pressure due to the property of water to prevent compression is relatively evenly distributed over the entire surface of the fetus. In the opposite situation, when the hydraulic shock absorption of the increase in intrauterine pressure on the fetus disappears after amniotomy, the most voluminous part of the fetus, the head, is exposed to the greatest impact. The latter, due to prematurity and immaturity of the fetus, is more malleable to compression compared to that of a full-term child. Ischemia of the head tissues is layered with hypoxic-ischemic lesions of the central nervous system under the influence of hypoxia as a result of switching off part of the placenta from the fetal-maternal metabolism; and immediately after the cessation of hypoxia, violations of the systemic and regional cerebral blood flow develop. In conditions of hypoxia, the fetus cannot adapt to the increase in permanent pressure on the head and its abrupt increase in the fight, which is an additional aggravating factor. A possible explanation of the established association between amniotomy and cerebral circulation disorders in premature infants after operative delivery in progressive

PPRP requires additional studies to confirm or exclude the presented mechanism of association of amniotomy in PPRP and hemorrhages in the ventricles of the brain (VJC).

CONCLUSION

Emergency operative delivery in case of premature birth and premature detachment of the normally located placenta without preliminary amniotomy leads to a decrease in intraventricular hemorrhages of the newborn and a decrease in intraoperative blood loss.

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