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Research Article

# FETOPLACENTAL INSUFFICIENCY: CHANGES IN MATERNAL AND FETAL HEMODYNAMICS

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## ABSTRACT

Placental insufficiency (PI) is a syndrome caused by morphofunctional changes of the placental complex in response to various pathological conditions of the placenta and the fetus [3, 6, 12].

## KEYWORDS

Fetoplacental insufficiency (FPI), placenta, ozone therapy, mother-placenta-fetus system, fetal growth and development retardation.

## INTRODUCTION

At the same time, the syndrome causes a change in compensatory-adaptive mechanisms of the placenta at the levels of molecular, cellular and tissue structures as a result of changes occurring in the fetus, uterus-placental complexes. This, in turn, leads to a violation of the functions of the placenta, that is, with a violation of functions such as transport, trophic, endocrine, metabolic, antitoxic, the probability of various pathologies in fetuses and newborns increases [6, 8, 17, 24]. Pathogenetic aspects of PI in infectious diseases depend on toxinemia, homeostasis disorders, hemodynamic shifts, hemodynamic shifts in the "mother-placental-fetus" system. The location and duration of the pathological process, the duration of the pathological process, the clinical manifestations of the disease, the type and virulence of the pathogenic microorganism, the route of transmission of the microorganism from the mother to the fetus, the adaptation of the microorganism to the placental complex, the gestation period, the mother and the fetus are of great importance in the case of damage to the placenta and fetus by an infectious agent. state of immunological protection. The time factor plays an important role, since chronic PI is more likely to occur with 2-3 repeated and long-term infections than with a single infection [6, 9, 12, 18, 25].

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According to Alamazyan E.K. [1], the main pathogenic levels of placental insufficiency are changes in the metabolic and synthetic activity of the placenta, disorders of the uterine-placental and feto-placental blood circulation systems. Also, the growth of a complete trophoblast into the spiral arteries leads to its insufficient perfusion and changes in the secretion of humoral factors.

Accordingly, the use of medical ozone in the treatment of placental insufficiency, which has a multifactorial nonspecific effect, seems promising [2, 5, 9, 17, 28]. Medical ozone is an ozone-oxygen mixture obtained from ultrapure oxygen by decomposing it under a weak electric charge or under the influence of ultraviolet radiation. There are two mechanisms of ozone action: direct and indirect [4]. The mechanism of direct action is related to the disinfecting activity that leads to the destruction of the integrity of the plasma membrane of bacteria due to the oxidation of phospholipids and lipoproteins, resulting in the loss of the viability of the bacterial cell and its ability to reproduce. The antiviral effect of ozone is carried out by the oxidation of virion receptors, as well as by disrupting the synthesis of viral proteins due to a change in the activity of the reverse transcriptase enzyme. There is evidence of a clear therapeutic effect of ozone therapy in diseases of repeated viral infection, which is associated with a large number of lipids (up to 22%) in the viral capsule that easily interact with ozone [11, 16, 23].

Goal: Improvement of ways of carrying pregnant women with fetoplacental insufficiency using ozone therapy.

RESEARCH MATERIALS AND METHODS. The results of pregnancy and childbirth were studied in 38 patients diagnosed with fetoplacental insufficiency, who applied to the obstetrics department of the SamSMU multidisciplinary clinic No. 1 between 2020 and 2022. Somatic and obstetric-gynecological anamnesis data were studied in all patients. Particular attention was paid to past infectious and inflammatory diseases, as well as reproductive function (miscarriage, premature pregnancy, induced abortions, antenatal fetal death), the course and results of previous pregnancies, the course and complications of this pregnancy.

The study of objective examination data included a general examination, body weight and height measurements, and determination of body type. The condition of the respiratory, cardiovascular, digestive, urinary and nervous systems was evaluated. Obstetric examination included determination of pregnancy period, measurement of abdominal circumference and the height of the uterine fundus, determination of its tone, paying special attention to the correspondence of the size of the uterus to the duration of pregnancy. During the external examination, the position of the fetus, its appearance and the part lying in front were determined, the heartbeat of the fetus was heard.

Among the methods of laboratory examination, indicators of general blood and urine analysis, smear analysis, coagulogram and hemostasiogram were studied. Among the instrumental methods, UST was performed along with complete fetal dopplerometry.

According to the treatment tactics, patients were divided into 2 groups: 1 main group 18 patients who underwent complex treatment with FPI (in addition to ozone therapy), 2 comparison group 20 pregnant women with FPI detected during conventional treatment Women.

To analyze and interpret the research results, the StatSoft package "STATISTIC" (version 7), Microsoft Excel 2010 spreadsheet for Windows (MS Office, USA) data processing tools were used.

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## RESULTS

The age of the patients ranged from 18 to 39 years, with an average of 27.4±4.1 years. There was no statistical difference in the age of pregnant women between the groups.

No deviations from the population norms were found in the analysis of mass-height ratio in the examined women. Before pregnancy, the average body weight was 61.2+2.5 kg, the average height was 165.3+5.8 cm. When analyzing the marital status of pregnant women, all women in the studied groups were in a registered marriage.

The most common diseases were ENT diseases (33.3% in group 1 and 35% in group 2) and urinary system diseases (38.9% and 30% in groups, respectively). A significant share of chronic diseases of the thyroid gland (16.7% and 20%) and gastrointestinal tract (16.7% and 20% in the groups, respectively) is also noteworthy. In addition, we found that in both groups, chronic extragenital pathology was present in several organs: for example, the ratio of the frequency of pathology to the number of patients with chronic pathology in the group was 1.69 and 1.54. In patients with extragenital diseases of different localization, the combination of two was most often noted (22.2 and 25% in groups of 4 and 5 women, respectively), less often - the combination of 3 or 4 extragenital chronic diseases (16.77% and 20 % respectively) was observed.

Thus, approximately one-third of women in each group had a combined extragenital pathology, a similar percentage of patients did not have a severe somatic background, and a slightly larger part had monoorgan pathology. Statistical intergroup analysis of the structure of extragenital pathology in pregnant women did not reveal significant differences between groups (p>0.05).

The age of menarche was almost the same in the groups and was on average 13.1 ± 1.2 years. Menarche was on time in most women (11 - 61.1% in group 1 and 13 - 65% in group 2), 7 women in groups (38.9% and 35%), respectively, with a late onset of menstruation, no statistically significant differences between groups were detected.

The studied groups were compared according to the incidence of uterine pathology: fibroids in one woman in each group, endometriosis in 11.1% and 10%, endometritis in 33.3% and 35%, respectively, as well as salpingo-oophoritis (3 - 16, 7% and 3 - 15.0, p>0.05), there were gynecological diseases such as polycystic ovary syndrome (4 - 22.2% and 3 - 15.0%, p>0.05).

In patients with chronic salpingo-oophoritis and/or endometritis of indolent character, treatment is difficult and there is a tendency to many recurrences, therefore, a complete examination was carried out with identification of pathogens by microbiological or molecular biological methods. Due to the high frequency of infectious and inflammatory diseases of the genitals (endometritis, salpingo-oophoritis), we analyzed the spectrum of previously identified bacteria and viruses in women from both groups. A number of microorganisms such as Candida (38.9% and 35%), herpes simplex virus (22.2% and 25%), cytomegalovirus (5.56% and 20%) were at high levels in the examined patients. Mycoplasmas (11.1% and 15%), gardnerella (16.7% and 15%), and chlamydia (11.1% and 10%) were less common, statistically significant differences between groups were not detected.

According to the obstetric anamnesis of women in the examined groups, all women were pregnant again, there was no significant difference between the groups in pregnancy and delivery parity, p>0.05. 18 (47.36%) women who gave birth for the first time, 20 (52.54%) women who gave birth again made up 20

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(52.54%) women. Of interest was the study of previous pregnancy outcomes in patients.

When analyzing the reproductive activity of women, a high frequency of non-developing pregnancy (33.3% and 35% in the groups) and medical abortions was revealed, the latter was 27.8% in the main group and 20% in the comparison group. In addition, the frequency of spontaneous abortions was also high - 16.7% and 20% by group, respectively.

When the complications that occurred during previous pregnancies were studied, they were often complicated by the threat of abortion in the early stages of pregnancy in women: 12 - 66.7% in group 1 and 60% in group 2, as well as chronic placental insufficiency - 8 (44.4 %) and 9 (45%) women, respectively, by group, p>0.05. Also, cases of premature birth in group 1 - 5 (27.8%) women, in group 2 - 4 (20.0%) and uterine infection - 3 women by group, respectively 16.7% and detected in 15%, p>0.05. The rate of anemia during previous pregnancies was very high - in 12 patients in group 1 (66.7%), in group 2 - in 10 patients (50%), p<0.05.

The most common complications of childbirth are premature infusion of amniotic fluid (4 in group 1 - 22.2% and in group 2 5-25%) and acute fetal hypoxia (3-16.7% and 3-15%). In group 1, the postpartum period was complicated by endometritis in one patient (5.56%), subinvolution in 3 cases (16.7%), and in group 2, the postpartum period was complicated by subinvolution in 4 cases (20%) complicated, p>0.05.

When analyzing the characteristics of pregnancy, its pathological changes in all trimesters attract attention. At the same time, the most frequent complication was early toxicosis: in 7 (38.9%) pregnant women in group 1, in 7 (35%) in group 2. Threatened abortion, clinically characterized by pain in the lower abdomen, bloody discharge from the genital tract, increased uterine tone, was detected in 6 (33.3%) women in group 1 and 5 (25%) in group 2 in the first trimester. In the II trimester, from 4 people in groups (22.2% and 20%, respectively). When the groups were compared in terms of pregnancy complications in the first and second trimesters, no significant differences were found (p>0.05).

Anemia was also more common - observed in 13 (72.2%) and 15 (75%) women in the groups, respectively. When ozone therapy was used in the complex treatment of chronic FPY, a positive trend was identified from the point of view of clinical blood analysis. The initial number of erythrocytes in the studied groups did not have a statistically significant difference (3.59x10 "/or 3.61x10 / l, p> 0.5). After introducing efferent methods into the standard course of treatment in the group of pregnant women, group 2 (from 3.61x10/l to 3.71x1012/l) a statistically significant (p<0.001) trend of increase was revealed (from 3.59x10"/l to 3.85x10"/l).

Hemoglobin level, without significant differences between groups before therapy, in group 1 - 93.6 g / l and in group 2 - 92.4 g / l, (p> 0.2), after the respective treatment both although it increased in the group, its increase was statistically significant (p<0.001) only in the 1st group. From 93.6 g/l to 124.1 g/l in group 1, from 92.4 g/l to 105.2 g/l in group 2.

Initially, patients in both groups had decreased serum protein (59.3 and 60.4 g/l in the groups, respectively), but none of the patients had clinical manifestations of hypoproteinemia. It can be seen that the protein level in pregnant women of group 1 after 3 weeks of ozone therapy sessions did not change clinically and was 62.8 g/l, p<0.001. In group 2, the amount of total protein in the blood plasma did not change significantly and was 61.2 g / l.

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The average level of bilirubin, urea and creatinine decreased significantly after efferent methods of therapy. The data presented show a statistically significant decrease in the level of liver enzymes after the complex method of therapy.

The results of the study showed that both groups had signs of activation of intravascular coagulation, which is characteristic of patients with chronic placental insufficiency against the background of pregnancy complications, in which high levels of fibrinogen were noted. Patients in the main group were prescribed ozone therapy + anticoagulants, pregnant comparison groups were given anticoagulant therapy with low molecular weight heparins.

After therapy, the level of fibrinogen in both group 1 and group 2 (by 25% and 4.2 g/l in group 1, by 15.8% and 4.8 g/l in group 2 increased), indicators of platelet aggregation (in group 1 decreased by 24.3% to 44.3%, in group 2 - decreased by 20.8% to 45.4%) and prothrombin index (1 - group decreased by 18.5% to 96.4%, in group 2 - decreased by 15.5% to 99.2%) significantly decreased ($p<0.01$-$0.001$).

## CONCLUSIONS

Thus, the timely complex therapy of FPI using traditional and ozone therapy methods helped to correct the changes in the blood coagulation system and normalize the hemostasiological indicators of the examined patients, in our study, in the main group, the blood clotting potential due to plasma and platelet connections was significantly increased. stabilization was observed. At the same time, the biochemical blood analysis showed a slight increase in the total protein content, a decrease in the level of liver enzymes, an improvement in the functioning of the body's natural detoxification systems, and a significant decrease in the level of endogenous intoxication.

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