Prognosis of Placental Insufficiency in Pregnant Women Treated for Coronavirus

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ABSTRACT

The aim of the scientists' research is to optimize the treatment of pregnant women with a moderate form of a new coronavirus infection by including a sorbent in complex therapy

Keywords: Women, prognosis, pregnant women

Introduction. At the end of 2019, the global medical community was faced with a new coronavirus infection COVID-19, which reached pandemic proportions in 2020 [1,38]. Pregnant women constitute a special group of the population that requires increased attention due to the fact that pneumonia occupies the third place in the structure of indirect causes of maternal mortality [1,3]. It rapidly progresses from focal to diffuse bilateral, which quickly leads to hypoxemic respiratory failure [2,3].

But the lungs, unfortunately, are not the only organ that affects SARS-CoV-2. Almost all organs and systems, including the gastrointestinal tract, are involved in the pathological process. The reason is the massive expression of angiotensin converting enzyme 2 in the glandular cells of the stomach, vascular endothelial cells, enterocytes of the small intestine, rectal epithelium. There is a severe intestinal lesion with a violation of the structural elements of its wall, separation of intercellular interactions [3,6].

COVID-19 can complicate the course of pregnancy, causing respiratory distress syndrome, premature birth, development of fetoplacental insufficiency, perinatal losses [4,8,10,12].

The leading place in the pathogenesis of a new coronavirus infection is occupied by intoxication syndrome, the severity of which determines the severity of the course of the disease, the occurrence of complications and the outcome of the disease [14,28]. In most cases, the place of accumulation of toxins is the gastrointestinal tract [16,32]. The use of enterosorbents, for example, colloidal silicon dioxide, can help reduce intoxication and, accordingly, improve the prognosis of the disease [17,34].

In the literature at the time of writing, the prognosis of placental system insufficiency in treated for coronavirus infection was not found any source, and we referred to the articles by authors A.V. Romanovskaya, E.V. Mikhailova, N.E. Denisyuk, D.A. Tyapkin on the topic of enterosorption in pregnant women with COVID-19 and express Thanks for sharing your results. However, there are examples of effective treatment of gestosis due to the elimination of endotoxins [9, 10] and

intoxication syndrome of various origins [11, 12].

The aim of the scientists' research is to optimize the treatment of pregnant women with a moderate form of a new coronavirus infection by including a sorbent in complex therapy [18, 36].

Materials and methods of research. According to the authors' description, the study was conducted at the clinical base of the Department of Obstetrics and Gynecology of the Pediatric Faculty of the Saratov State Medical University named after V.I. Razumovsky of the Ministry of Health of Russia (Saratov City Clinical Hospital No. 10). In 2022, 87 pregnant women whose gestation period was 30 weeks or more were examined, and two groups were formed. Group 1 included 42 patients (average age – 32.2 [24.0; 39.0] g.), who were prescribed standard treatment according to the 4th version of the methodological recommendations for the organization of medical care for pregnant women, women in labor, maternity hospitals and newborns with a new coronavirus infection [2.19]. Group 2 consisted of 45 pregnant women (average age – 31.0 [22.0; 40.0] g.) who, in addition to standard treatment, received the drug silicon dioxide colloidal. This drug was prescribed upon admission to the hospital in the form of an aqueous suspension at a dose of 0.1 g / kg per os three times a day an hour before meals, a course of 10-12 days [13,27].

Indicators of endotoxicosis were studied in both groups. Clinical – duration of the febrile period, tachycardia, weakness, headache, and hematological – leukocyte intoxication index (LII) according to Kalf-Kalif, the ratio of the number of neutrophils to lymphocytes (ONL) [15,16].

The indicators of endogenous intoxication and systemic inflammatory response were studied. The concentration of C-reactive protein (CRP) was determined by a highly sensitive method on a Bering Marburg GmbH, Dade (Germany – USA) nephelometer according to the manufacturers' protocol. To determine the concentration of interleukin-6 (IL-6) – a set of reagents from Eurogenetics (Belgium). The concentration of medium-mass molecules (MSM) in the blood was determined by extraction-spectrophotometric method modified by N.I. Gabrielyan et al., 1984 [13,17,18]. The measurement was carried out on a SF-46 spectrophotometer in UV light at a wavelength of 280 nm. The MSM level was expressed in units quantitatively equal to the extinction indices [27,45].

The course of pregnancy was also evaluated. The presence or absence was taken into account: anemia and its severity, fetal growth retardation, threats of premature birth, fetoplacental insufficiency; the amount of amniotic fluid and complications of childbirth were evaluated. The results of cardiotocography, Doppler examination before and after treatment, and photometric indicators of newborns in both groups were taken into account [27,46].

All the results of the conducted studies were subjected to statistical analysis using Statistica 10.0 programs (StatSoft Inc., USA), through which the Student's criterion, the significance of differences were determined, the average and the arithmetic mean error (M ± SD) were calculated in the case of a normal distribution of features. The Shapiro-Wilk criterion was used to clarify the normality of the distribution, all the parameters studied and described in this paper had a distribution close to normal. Absolute and relative frequencies (% of the total number of observations) were also calculated for qualitative indicators, the significance of differences (p) was determined by a parametric reliability criterion (t). When comparing qualitative features in unrelated groups, the method of cross-tabulation using the criterion $\chi 2$ was used. The critical level of significance in the study was $p < 0.05$ [27,47].

Results and their discussion. According to the authors, it is described that when

comparing the 1st and 2nd groups, it was found that there were no statistically significant differences in the timing of gestation, the age of patients, the presence and nature of estragenital pathology and the severity of the new coronavirus infection, the groups were almost identical [27,48]. A comparison of the duration of clinical manifestations of intoxication in groups 1 and 2 showed that the duration of hyperthermia in pregnant women taking colloidal silicon dioxide was on average 2.4 days less, tachycardia – 2.2 days, weakness – 2.1 days, headache – 1.7 days than in patients receiving standard treatment. Moreover, the differences between group 1 and 2 are statistically significant (p = 0.043, p = 0.021, p = 0.038, p = 0.048, respectively) [27,49]. When studying hematological indices of intoxication and biochemical markers in groups with different treatment methods, it was found that enterosorption has a positive effect on the detoxification process. Thus, at the peak stage of the disease in women taking colloidal silicon dioxide, the level of MSM was on average 0.43 wholesale units and CRP by 7.1 mg/l lower than in group 1. And the values of IL%6 were 2.3 ng/ml lower in group 2 patients than in women receiving standard treatment [27,50]. The level of hematological intoxication indices (LII, ONL) did not have statistically significant differences between the groups, however, their average values in the group taking colloidal silicon dioxide were slightly lower than in patients receiving only standard treatment [27,51]. Thus, the use of the preparation silicon dioxide colloidal promotes faster elimination of endotoxins from the body, reducing the duration of their negative effects, which proves both a decrease in clinical manifestations of endogenous intoxication and an improvement in laboratory data in the two compared groups [27,52]. In group 2, mild anemia was observed 17.5% less often, anemia of moderate severity was 14.7% less than in group 1, and the differences were statistically significant. In women treated with colloidal silicon dioxide, fetal growth retardation was 17.1% less frequent, threatening premature birth requiring hospitalization was 17.3% less frequent, fetoplacental insufficiency was 19.7% less frequent, polyhydramnios were 20.1% less frequent, and water scarcity was 22.2% less frequent, and the differences were statistically significant for all the above parameters. But premature birth occurred with approximately the same frequency in both groups [27,53]. When comparing the results of cardiotocography at admission to the hospital, there were no statistically significant differences between the studied groups (p = 0.568). After the standard course of treatment of COVID-19 and fetal hypoxia in patients receiving additional silicon dioxide colloidal, normal cardiotocography was noted 16.5% more often (p = 0.035), initial signs of hypoxia – by 15.1% (p = 0.046), pronounced signs of hypoxia – by 22.2% (p = 0.013) and the threat of fetal death is 3 times less frequent (p = 0.015) than in women who received standard treatment [27,54]. When comparing the results of the Doppler study at admission to the hospital, there were no statistically significant differences between the studied groups (p = 0.073). After the course of treatment in group 2, the absence of signs of impaired blood flow was recorded 21.1% more often than in group 1 (p = 0.016). Initial signs of impairment and more serious blood flow disorders occurred with the same frequency in both groups (p = 0.679 and p = 0.084, respectively). Thus, a violation of blood flow of the IB degree was recorded in group 1 more often by 25.4% (p = 0.016), II degree – by 27.9% (p = 0.013) than in group 2. And a violation of blood flow of the III degree was recorded in one patient receiving standard treatment, and was absent in the group of women receiving additional silicon colloidal dioxide [27,55]. When comparing the photometric parameters of newborns in the studied groups, statistically significant differences were also revealed. Thus, the average fetal weight was 256 g more in group 2 (p = 0.015), the average fetal height was 2.4 cm more (p = 0.028) than in group 1 patients. The

average placental weight in patients treated with colloidal silicon dioxide was 15 g higher than that in group 1 (p = 0.049), and the placenta area was 13.9 cm2 larger (p = 0.038) [27.56].

Conclusion. 1. Pregnant women are less tolerant to respiratory infections, including COVID%19, which leads to a severe course of the disease up to a fatal outcome. Therefore, in the context of the ongoing pandemic, it is necessary to look for methods of protecting the mother and fetus to improve pregnancy outcomes [27,57].

2. The addition of colloidal silicon dioxide to standard treatment, which is absolutely safe for pregnant women, helps to reduce the level of endogenous intoxication in patients with a new coronavirus infection in a moderate form, which is manifested by positive dynamics of both clinical symptoms and laboratory diagnosis of endogenous intoxication syndrome [27,58].

3. By reducing the intoxication load on the body, the negative impact of coronavirus infection on the course of pregnancy and the fetal condition of the fetus is significantly reduced [27,59].

Based on the above study, we express our gratitude to the authors and hope that the study and prognosis of placental insufficiency in pregnant women treated for coronavirus infection is promising research for further study of patients with this condition.

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