



Comparative Analysis of the Morphofunctional State of the Fetoplacental System in Obese Pregnant Women

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Abstract: The high frequency of somatic diseases, gynecological diseases, complications of pregnancy in patients with obesity is the backdrop for a violation of the processes of formation and functioning of the placental complex; mother diagnosed with obesity significantly higher rates of resistance uterine artery and umbilical artery; 1.5 times more likely to be diagnosed degenerative changes in the placenta; 3 times more often revealed polyhydramnios; according to the morphological study of placentas it noted a higher rate of cardiovascular, ischemic and inflammatory changes; and therefore, should be classified as obese pregnant women at high perinatal risk.

Keywords: obesity, obese pregnant women, placental complex, perinatal risk.

Obesity is one of the most socially significant chronic diseases that has assumed epidemic proportions, while obesity in pregnant women is attracting increasing attention. Despite constant improvements in the system of antenatal care and obstetric care, the number of pregnant women with obesity is constantly increasing, and therefore the relevance of this issue is of particular importance [6].

The system "mother - placenta - fetus" is an independent a functioning system operating on the principle of feedback, which ensures the growth, development, gestation of the fetus [1,2,4]. The laying of the embryo, the formation and development of the placenta occur against the background of maternal obesity and its complications. This is related to the features of the functioning of the fetoplacental complex (FPC) in pregnant women with impaired fat metabolism, features of fetal growth, placental hemodynamics [3,5].

The purpose of the study was to assess the functional state of the "mother - placenta - fetus" system in obese pregnant women.

Materials and methods

Within the framework of the study, two groups of observation of pregnant women in the third trimester of gestation were identified: the comparison group included 40 patients with normal body weight, the main group - 54 patients with impaired fat metabolism (FMO). The selection criterion for the groups was body mass index (BMI), calculation formula: $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$. The comparison group included patients with $BMI < 25$, the main group included pregnant women with $BMI > 30$. BMI was calculated without taking into account weight gain during pregnancy. To form groups that best meet the objectives of the work, the study did not include women with increased body weight $25 < BMI < 30$, type 1 or 2 diabetes mellitus, endocrine obesity, multiple pregnancy.

A clinical, instrumental examination of pregnant observation groups was carried out at the Bukhara Regional Perinatal Center. Ultrasound and dopplerometry were performed on a MINDRAY DCN6 diagnostic scanner. An analysis of the data of the morphological study of the placenta was carried out (according to the method of Avtandilov G.G., 2002).

Results and discussion

There were no statistical differences in age in patients of the compared groups. The average age of pregnant women in the control group was 27.03 ± 3.52 years and ranged from 21 to 34 years. In the obese pregnancy group, the age ranged from 19 to 35 years, the average age was 28.6 ± 3.9 years, while 21 patients were in the age group from 30 to 35 years. Pregnant women with obesity were, on average, somewhat older than patients from the comparison group, which can be explained by an increase in body weight acquired during life, associated to a greater extent with the alimentary factor, as well as a later onset of pregnancy in patients with obesity than in the group women with normal body weight.

When analyzing the frequency of childbirth, it was revealed that the number of multiparous women (56.7%) prevailed in the main group, and primiparas (63%) prevailed in the comparison group. The gestational age, in which the study was conducted, in the comparison group was 36.2 ± 2.9 weeks, in the main group - 34.7 ± 2.6 weeks; the average body weight of patients in the comparison group was 70.4 ± 1.2 kg in the group of pregnant women with obesity - 93.8 ± 1.1 kg. Total weight gain (OPV) during pregnancy was the least in pregnant women with III degree of obesity and amounted to 7.1 ± 1.3 kg ($P < 0.05$, when compared with the control group), in pregnant women with I degree of obesity OPV amounted to 11.5 ± 0.9 kg II degree - 9.8 ± 1.1 kg in the control group - 13.8 ± 1.4 kg. The study of the features of the obstetric anamnesis of patients indicates the possible causes of the violation of the formation and functioning of the fetoplacental complex. The frequency of registration of spontaneous miscarriages in history in pregnant women with obesity was 26.6%, in the control group - 13% ($P < 0.05$). The frequency of non-developing pregnancies in history in pregnant women with obesity was 20%, which is also significantly higher than in women with normal body weight - 8.7% (trend). Antenatal fetal death in history was detected in one patient from the main group, which was 1.6%.

The high frequency of somatic pathology, gynecological diseases, complicated pregnancy in obese patients is a background for disruption of the processes of formation and functioning of the fetoplacental complex.

To analyze the data of instrumental examination, morphological examination of the placenta in the group of pregnant women with obesity, two subgroups were distinguished: A - without clinical manifestations of placental disorders (PI), established during a comprehensive examination of pregnant women (40 patients), B - with clinical manifestations of PN (14 patients). The control group included 40 patients with normal body weight and no clinical manifestations of PI. To assess the functional state of the "mother - placenta - fetus" system in pregnant women with obesity, uteroplacental and fetal blood flow was studied using Doppler ultrasound, an analysis was made of ultrasound examination of the placenta, the state of amniotic fluid and the morphological characteristics of the placenta.

According to the ultrasound examination of the FPC, 4 (10%) patients from subgroup A, 1 (7%) - from subgroup B and 2 (5%) - in the control group had placental hypertrophy; hypoplasia ("thin placenta") was detected only in subgroup B in 1 (7%) patient; expansion of the intervillous space and degenerative changes in the placenta were detected in 6 (15%) patients of subgroup A, 5 (35.7%) - from subgroup B and 3 (7.5%) - from the control group; oligohydramnios - in 1 (2.5%) patient from subgroup A and in 5 (35.7%) - from subgroup B, this pathology was not detected in patients of the control group; polyhydramnios was detected in 6 (15%) patients of subgroup A, in 2 (14.2%) - from subgroup B and in 2 (5%) - in control. Thus, in pregnant women with obesity, a greater number of ultrasound markers of disturbances in the formation and functioning of FPC were revealed.

Features of the functioning of the FPC in pregnant study groups were reflected in the results of a histological study of placental tissue. In pregnant women with obesity (subgroup A), more often than in the control group, delayed villi maturation was detected (15 and 10% of cases, respectively), stasis of uniform elements (30 and 15% of cases), reduction of the vascular bed (7.5 % and 5% of cases), ischemic (17.5 and 10% of cases) and inflammatory (30 and 17.5% of cases) changes in the placenta. Compensatory changes in the placenta were manifested by hyperemia of the terminal villi,

hypervascularization, hyperplasia and hypertrophy. Compensatory changes in the placenta were detected in each group of pregnant women: in 8 patients (20%) in the control group, in 11 patients (27.5%) in the obese group (A) and in 6 patients (35.5%) in the group obese (B). In pregnant women with obesity and PI, significantly more often than in the control group, there was a delay in the maturation of villi, stasis of formed elements, sclerosis of the villi, placental infarcts ($P < 0.01$).

Conclusions:

The high frequency of somatic pathology, gynecological diseases, complicated pregnancy in patients with obesity is a background for the violation of the processes of formation and functioning of the FPC.

Features of the functioning of the FPC in pregnant women with obesity are as follows: according to the results of dopplerometry, a significant increase in IR of the uterine arteries, IR and LMS of the umbilical artery ($P < 0.01$), a decrease in PI in the MCA (trend). According to the results of an echographic study of the placenta, degenerative changes, placental cysts, and expansion of the urinary tract are diagnosed 1.5 times more often; polyhydramnios is detected 3 times more often. According to the morphological study of the placenta, there is a high frequency of vascular, ischemic and inflammatory changes in the placenta. In connection with these facts, it should be noted that pregnancy with maternal obesity proceeds with the tension of compensatory-adaptive mechanisms in the work of the FPC, pregnant women with obesity should be attributed to a high perinatal risk group.

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