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FEATURES OF HEMODYNAMIC CHANGES IN SPIRAL ARTERIES WITH LOW PLACENTATION AT THE EARLY GESTATIONAL AGE

Abstract. *The article presents the results of Doppler studies in spiral arteries of indices of resistance and blood flow velocities in the I trimester of gestation in pregnant women with low placentation. As a result of the studies, a significant increase in resistance and a decrease in blood flow rates in early pregnancy in pregnant women with low placentation was found in comparison with normal placement of the chorion, which may be a factor of high risk of primary placental dysfunction development in the future.*

Key words: *low placentation, I trimester of gestation, Doppler examination, spiral arteries.*

Introduction. Among the causes that negatively affect the course of pregnancy and the state of the fetoplacental system, the anomalies of the implantation of the fetal egg play an important role, in particular, low placentation accompanied by insufficient functioning of the uterine-placental complex, which is caused by the character of the vascularization of the lower parts of the uterus and a decrease in the placental blood flow [2, 3]. The adequate functioning of the mother-placenta-fetus system depends primarily on the process of implantation of the fetal egg, cytotrophoblastic invasion, as well as the subsequent transformation of the spiral arteries. The results of studies carried out in recent years have shown that the formation of intrauterine suffering is laid precisely in the early gestation period, when problems in the body of a woman, the condition of the endo- and myometrium determines the inferior formation of the embryo, fetus and extraembryonic formations: amniotic fluid, umbilical cord, placenta, placental bed. Disruptions in the formation of the vascular system of the mucous membrane of the uterus is accompanied by structural changes of the latter; conditions for implantation of the fetal egg are significantly reduced. In this regard, a noninvasive study of the endometrium during blastocyst implantation is important [5]. The method of Doppler investigation of blood flow in the fetoplacental system is safe, relatively simple and at the same time highly informative in assessing its functional reserves [1, 4].

The leading role in the pathogenesis of placental dysfunction is played by disorders of uterine-placental circulation.

The constancy of the uterine-placental blood flow ensures a gestational reorganization of the spiral arteries. The physiological changes experienced by spiral arteries with the progression of uncomplicated pregnancy are characterized by elastolysis, degeneration of the muscular layer and replacement of the muscular and elastic fibrinoid shell with the expansion of the artery lumen [3].

Objective of the study. Conduct an evaluation of Doppler blood flow in the spiral arteries with low placentation.

Materials and methods. The main group of the study included pregnant women in the period from 5 to 12 weeks of pregnancy with a low location of the chorion (50 pregnant women). The control group consisted of 50 pregnant women at the same gestational age with the arrangement of the chorion in the uterine body and fundus. All the examined women of the primary and control groups were divided into 2 subgroups, depending on the gestation period (25 pregnancies in the period of 5-8 weeks of gestation and 25 women in the period of 9-12 weeks of gestation). The groups studied were representative of age, height and weight, and social employment. All were subjected to ultrasound on the apparatus «Voluson Exspert 730», to all women the location of the chorion and the fetal egg, the crown-rump length of the fetus were determined, as well as

the Doppler examination of the blood flow in the spiral arteries of the uterus. Indices of vascular resistance were calculated: the systolic-diastolic ratio (SDR), the pulsation index (PI), the resistance index (RI), as well as the pulse systolic rate (PSR), the end diastolic velocity (DV), the average distal velocity (ADV), the peak speed averaged over time (PSAT). Statistical processing of the obtained indicators was carried out by determining the Student's criteria.

Results of the study and their discussion.

When analyzing the data obtained, it was found that in pregnant women with a low chorion placement at 5-8 weeks of gestation with Doppler study in spiral arteries, all resistance indices were higher: SDR- 3.9 ± 0.3 , PI- 0.71 ± 0.04 , RI - 1.4 ± 0.1 compared to the control: SDR- 3.0 ± 0.3 , PI- 0.58 ± 0.03 , RI- 1.1 ± 0.08 (p0.05). Accordingly, blood flow velocities were lower in the main group, but the only significant difference was in the PSAT index, which in the main group was 19.5 ± 1.2 cm / s, and in the control group - 29.6 ± 1.8 cm / s.

This may indicate an imperfect transformation of the walls of the spiral arteries in the abnormal position of the chorion, disorders of the first wave of invasion of the cytotrophoblast and the disrupted blood supply of the emerging placental bed. In turn, this determines the limit of utero-placental perfusion, the inadequacy of blood flow in the intervillaceous space, where the blood flows from the spiral arteries, the stasis of blood in it and the disruption of the gas exchange process.

When evaluating Doppler indices in spiral arteries in 9-12 weeks of pregnancy, high peripheral resistance values remain in the main group, respectively, SDR- $3,1 \pm 0,4$; PI 0.64 ± 0.05 ; RI- $1,1 \pm 0,11$ in comparison with the control of $2,1 \pm 0,2$; 0.5 ± 0.04 ; 0.82 ± 0.04 , respectively (p0.05). SDR rates by 32.2%, PI by 21.9%, and RI by 25.5% higher in women with low placentation compared with pregnant women with normal placement of chorion. So, we see that there is a preservation of high preplacental resistance of the blood flow after passing the "peak" of the first wave of involution of the cytotrophoblast.

The decrease in blood flow rates is more significant in the spiral arteries during 9-12 weeks of gestation, which is manifested by a significant decrease in SDR- $25,4 \pm 1,4$ cm / s, ADV- $24,2 \pm 1,4$

cm / s, PSAT- $38,1 \pm 1.6$ cm / sec in pregnant women with low chorion distribution compared with control group, where the corresponding indices make up 33.7 ± 1.5 cm / s, 34.4 ± 1.4 cm / s, $56.3 \pm 2,1$ cm / sec (p0.05).

Consequently, the disruption of blood flow in spiral arteries with low placentation progresses in the dynamics of pregnancy, which leads to a deepening of placental dysfunction and an increase in the level of complications of pregnancy.

Conclusions. 1. With low placentation in the I trimester of gestation the formation of highly resistant blood flow and the decrease in blood flow rates occur in the spiral arteries.

2. The revealed changes in hemodynamics in spiral arteries with low placement of chorion may be the factors of high risk of development of primary placental dysfunction in the future.

Prospects for further research. To study the parameters of volume blood flow in the chorion with abnormal placentation.

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