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MORPHOMETRIC SUMMARY FEATURES INDICATORS OF TERMINAL VILLI IN PRETERM PLACENTA

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Abstract: In this study, morphometric features of terminal villi in term and preterm placentas were compared. Places of the cent of 35 patients whose pregnancy ended in premature birth and placentas of 30 women with physiological pregnancy and delivery at term were studied. Morphometric assessment was made with Carl Zeiss Axio Imager microscope using an image analysis software package. The number of capillaries in terminal villi of preterm placentas was found to be decreased, while the vessels-to syncytiotrophoblast distance was found to be increased. These results in a fell gas exchange between maternal blood and placental tissue, hypoxia and can cause early termination of pregnancy.

Key words: morphometry, placenta, terminal Willy, pre- maturity.

INTRODUCTION

A pressing problem in modern obstetrics is premature birth (PB). The incidence of premature birth remains significant, reaching 7-15 % [1,2]. Due to the immaturity of organs and life support systems, mortality and morbidity in children born prematurely, as well as the risk of repeated hospitalizations, are higher than in full-term babies . The mature placenta is a formation located between the chorionic and basal plates. Chorionic the plate on the fetal side is covered by the amniotic membrane. The main structural and functional unit is the cotyledon, represented by the stem villus and its branches. From the stem villi extend intermediate, ending with terminal villi. Terminal villi are the most numerous type of villi. Their main function and diffusion gases and nutrients from the mother to the fetus. The stroma of the terminal villi contains 5-6 capillaries, they are covered with syncytiotrophoblast . Quantitative and high quality grade terminal villi is one of the diagnostic criteria for the completeness of placental function [3,4].

methods are currently used analysis morphometric parameters, characterizing blood circulation and the severity of metabolic processes in the villi. During exacerbation of herpes and cytomegalovirus infections in pregnant women, pronounced changes occur in the reorganization of the bloodstream in the terminal villi of the placenta, the distance between the blood vessel and the inner surface of the syncytiotrophoblast , which leads to insufficient gas exchange [5,6]. For morphometric studies applied computer cytophotometry using the program " Photoshop ".

Conducted comparative morphometric study of terminal placental villi in miscarriage using image analysis systems on base microscope Axio Imager M1 c using the program " AxioVision " (Carl Zeiss). The area and perimeter of the terminal villi were determined, their capillaries And syncytiotrophoblast . A decrease was detected size And decrease indicators vascularization of terminal villi, especially in early eclampsia, What reflects formation placental hypoxia.

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Morphometry was performed on micropreparations using light microscopy at magnification. ×400.

We also studied the placental vessels from physiologically developing pregnancies and from pregnancies complicated by intrauterine growth retardation (IUGR). We stereologically assessed the morphometric parameters of the terminal and intermediate villi, established microvascular regression and extreme hypovasculation in the placental vessels during pregnancies complicated by IUGR. [IUGR.] Using electron microscopy and iTEM software (Germany) , the parameters of terminal villi were studied in cases of diabetes during pregnancy in comparison with placentas obtained from women with physiological pregnancy . An expansion of the vascular endothelial surface and an increase in the distance of vessels from the basement membrane were determined in pregnant women with diabetes. Using the method of stereological analysis of terminal villi in placentas of mothers with anemia, an increase in the capillaries of the terminal villi was established in comparison with the control group. Of particular interest are the changes in the terminal villi of the placenta, which carry out the exchange processes between the blood of the mother and the fetus in prematurity.

The aim of our study was a morphometric examination of the state of terminal placental villi obtained from mothers whose pregnancy ended prematurely.

MATERIALS AND METHODS OF RESEARCH

The work was carried out at the Regional Perinatal Center and the City Maternity Complex of Navoi The object of the study was 35 placentas from mothers whose pregnancy ended prematurely at 30-36 weeks of gestation (main group). The comparison group consisted of 30 placentas obtained from mothers with uncomplicated pregnancy who gave birth to full-term babies. Macroscopic, histological, and morphometric studies of the placentas were conducted . After a macroscopic study of the placentas, tissue fragments were cut out from the fetal zone of the placenta and fixed in 10% neutral formalin. Histological study were performed on paraffin sections stained with hematoxylin and eosin. Morphometry was performed using the analysis images on base microscope Carl Zeiss using the program « Axio Imager ". In the photo micropreparation placenta 5-12 visual fields were examined with terminal and, partially, with with interstitial villi. Using software, villi were counted in each field. of vision, their square, perimeter, horizontal and vertical dimensions, the number of capillaries and their distance in relation to syncytiotrophoblast .

The analysis of the results of morphological studies was carried out research. The placental-fetal coefficient (PPC) was calculated using a table of the ratio of fetal weight to placental weight at different stages of pregnancy . The results of the study were processed using the Statistica program. for Windows 6.0. Statistical analysis of the obtained The analysis of the material was carried out using standard methods of variation statistics. To determine the reliability of differences, the unpaired t (Student's) criterion was used. When comparing the frequency of the alternative distribution of features, the exact criterion was used. Fisher.

RESEARCH RESULTS AND THEIR DISCUSSION

Morphological study of placentas the main group showed a discrepancy with the gestational age in 100% of cases, a decrease in the number terminal villi, pathological immaturity, dissociated maturation of chorionic villi, predominance of intermediate immature differentiated villi located close to each other, and impaired branching. Such changes lead to a decrease in the diffusion capacity of the placenta, contribute to a slowdown in fetal body growth and the mass of the main organs with the development of chronic intrauterine hypoxia and body weight deficit. In placentas from mothers with premature pregnancy, hypoplasia was

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established in 38.6% of cases. In response to the development of intrauterine hypoxia, compensatory adaptive reactions occur, due to which the adverse effects of hypoxia are partially compensated for by weight gain, placental hyperplasia was established in 23.0% of cases. In the comparison group, the PPC ranged from 0.14 to 0.17 in 100% of cases, which corresponds to the indicators for full-term pregnancy. The entire structure of the villi is subordinated to one goal: to increase the area of contacts of fetal erythrocytes with the washing maternal blood. In the main group, the syncytial cover of the villi was thinned. Villous cytotrophoblast was absent. Compensatory angiomatosis was noted , the lumen of the capillaries was expanded , overfilled with erythrocytes. Angiomatosis of immature villi is accompanied by hemorrhagic disorders in the form of thrombosis of the intervillous space and infarctions of the villous tree, acute placental insufficiency. The latter was diagnosed in 47.2% of cases in the main group, in 6.8% in the comparison group (p=0.001).

In most terminal villi, immature and nonfunctional villi were detected. Maternal blood does not wash the closely spaced villi, these are the so-called " afunctional zones". The volume of maternal blood is reduced, hypoxia develops, hemostasis is impaired, thromboses and hemorrhages in the intervillous space, vessels and membranes, and ischemic infarctions occur. Signs of chronic placental insufficiency were detected in 91.8% of cases in the main group and in 8.6% in the comparison group ($p < 0.0001$). In the main group, in 92.3% of cases, abnormalities in the shape of the placenta (rim), umbilical cord attachment (membranous, marginal), membranes (constriction) were detected, which is 4.0 times more often than in the group with full-term pregnancy ($p < 0.0001$). In the placentas of the main group, involutional-dystrophic changes were detected 2.2 times more often than in the comparison group: fibrinoid necrosis, pseudoinfarctions , calcifications ($p < 0.001$). When studying the parameters characterizing inflammatory changes, the reliable difference ended prematurely, deviations of the studied parameters from the parameters of placentas of women with full-term pregnancy were established. The highest values of the area, vertical size and perimeter of terminal villi were found in the placentas of women who gave birth to premature babies. Poverty of blood vessels of terminal villi is noted in prematurity. The proportion of capillaries in the terminal villi of the placentas of the main group (4.8) was significantly less than the number of capillaries in the villi of the placentas of the comparison group (6.7), and the distance of most capillaries of the villi from the syncytiotrophoblast in the main group (1.7) was significantly greater than in the comparison group (1.0). A decrease in the content of vessels in the total volume of resorption villi and an increase in the distance between the blood of the mother and the fetus leads to insufficient gas exchange and hypoxia. It is not possible to find out the morphometric parameters of the terminal villi of the placenta during physiological pregnancy at different gestational stages and compare them with the parameters of the terminal villi obtained by us in premature pregnancy. Despite this , it can be concluded that in premature pregnancy, there are structural and functional changes in the terminal villi of the placenta, which are responsible for the metabolic processes between the blood of the mother and the fetus, leading to a decrease in gas exchange and nutrition of the fetus. This limits the placenta's ability to meet the needs of the fetus in late pregnancy and may result in miscarriage .

CONCLUSIONS

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1. The number of capillaries in the terminal villi of the placenta in prematurity is reduced, and the distance of most vessels from the syncytiotrophoblast is increased, this reflects the state of the placental hy -

poxysia and may cause premature termination of pregnancy.

2. Morphological analysis of placentas from women with premature pregnancy showed a discrepancy between the state of the placenta and the gestational age , a decrease in the number of terminal villi, pathological immaturity, dissociated maturation of chorionic villi, a predominance of intermediate immature differentiated villi located close to each other, impaired branching, and hemorrhagic disorders.

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