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CHORIONIC VILLI OF THE PLACENTA: MORPHOMETRIC MATURITY PARAMETERS IN PRETERM BIRTHS

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Introduction

Morphometric studies of chorionic villi in the placenta provide essential insights into the structural and functional changes that may contribute to the occurrence of preterm birth [1,2]. Such studies are crucial for understanding the pathogenesis of preterm labor and its implications for both the fetus and the mother [3]. Chorionic villi are key components of the placenta responsible for the exchange between maternal and fetal blood, and their morphology can reflect functional disturbances within the placenta [4].

Objectives

This study aims to establish the morphometric characteristics of placental villi in cases of preterm birth compared to physiological pregnancy. This involves a detailed examination of various types of villi, including stem, intermediate, and terminal types, as well as specific morphological features.

Materials and Methods

The study analyzed 30 placentas from preterm births and 30 placentas from normal pregnancies. All samples were fixed in neutral 10% formalin for 22-24 hours, dehydrated in alcohols, and embedded in paraffin at 58°C. Histological sections of 5 µm thickness were stained with hematoxylin and eosin, and with chromotropic blue according to N.Z. Slinchenko. Morphometric analysis was performed using ImageJ v1.52 software on digital images obtained with a Delta Optical Evolution 100 microscope and an Olympus SP550UZ digital camera. Statistical analysis was conducted using PAST v4.14 software to check for normal distribution and to compute both parametric and non-parametric statistical criteria.

Results

1. Stem Villi

The morphometric analysis revealed a significant increase in the percentage of "early" stem villi in preterm births compared to physiological pregnancy (5,4±0,24 vs. 0,1±0,01, p<0,05). These villi exhibited lower maturity and less developed vascularization, indicating disrupted placental maturation. The percentage of "late" stem villi remained at levels similar to those observed in normal pregnancy (4,2±0,20 vs. 4,5±0,22, p>0,05).

2. Intermediate Villi

In preterm births, there was a notable increase in the percentage of intermediate villi: immature (17,1±0,42 vs. 3,1±0,12) and mature (58,5±0,78 vs. 14,8±0,34) villi. This indicates a high level of immaturity and disrupted normal development of intermediate villi.

3. Terminal Villi

The percentage of terminal villi in preterm births was significantly reduced (5,4±0,11 vs. 38,1±0,49), and terminal "specialized" villi were almost absent (0,2±0,01 vs. 37,4±0,45). This reduction points to decreased efficiency in the exchange of substances between maternal and fetal blood, potentially resulting from abnormalities in the maturation of terminal villi.

4. Other Types of Villi

There was an increase in the percentage of trophoblastic and villous outgrowths, mesenchymal, and embryonic villi in preterm births (trophoblastic and villous outgrowths: 4,1±0,10 vs. 1,0±0,03; mesenchymal villi: 1,9±0,04 vs. 0,5±0,01; embryonic villi: 3,2±0,05 vs. 0,5±0,02). This finding may reflect deviations from the normal process of villous development.

Conclusions

The study of morphometric parameters of chorionic villi revealed significant differences between placentas in preterm births and those in physiological pregnancies. Key findings include:

1. An increase in the number of immature stem and intermediate villi in preterm births suggests disturbances in placental maturation.

2. A reduction in the percentage of terminal villi and terminal "specialized" villi indicates decreased efficiency in the exchange between maternal and fetal blood.

3. An increase in trophoblastic, villous, mesenchymal, and embryonic villi percentages may indicate abnormalities in the normal developmental processes of the placenta.

The results underscore the need for further research to deepen the understanding of the mechanisms underlying preterm births and their impacts on maternal and fetal health.

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