

PERSONAL CONTRIBUTIONS TO EARLY DETECTION OF PREGNANCY PATHOLOGY IN THE FIRST TRIMESTER

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Ovular sac implantation and placental development has an important role in the further development of pregnancy. In this process, the trophoblast that invades the spiral arteries in the myometrium has a key role, thus causing a decrease in vascular resistance in the uterine arteries. Inadequate trophoblastic invasion of spiral arteries is associated with preeclampsia, small for gestational age baby, abruptio placenta. Placenta combines the functions of the endocrine system, excretory system, respiratory system and absorption system. The fetal part develops from the chorion and the placental bed from decidua. Trophotropism is an adaptation mechanism of the placenta. If the blood supply is reduced to an endometrial area, the atrophy of adjacent placental villi occurs, and those villi at endometrial areas with better blood supply will proliferate. Different proliferation rate of chorial villi can lead to eccentric umbilical cord insertion on the placenta. There are studies that reveals that some placental abnormalities can be detected since the end of the first trimester of pregnancy

Early diagnosis of high risk pregnancies may help in developing strategies for prenatal care and prevention of these diseases, so we can decrease maternal and fetal morbidity and mortality. Our study focuses on the aspects of placental development at the end of the first trimester of pregnancy (11w-13w+6d).

THE AIM OF STUDY: 1. Ultrasound study of some aspects of placental development at the end of the first trimester of pregnancy and assessment of predictive values of biometric and morphological data. 2. Assessment of biochemical markers in terms of placental development. 3. Doppler study of utero-placental circulation at the end of the first trimester and assessing their predictive values. 4. Developing methods for early diagnosis and prevention of high risk pregnancies.

MATERIALS AND METHODS: The study is observational, case-control type. The study included 300 women with monofetal pregnancies at the end of the first trimester of pregnancy (11w-13w+6d). Pregnancies were followed up until birth. We obtained data on pregnancy-associated pathologies (eg. fetal malformation, spontaneous abortion, preeclampsia, intrauterin growth retardation) and data on birth (eg. infant birth weight, gestational age at birth). Control group consisted of pregnant women without complications. We studied the following biometric data: crown-rump lenght (CRL), gestational sac diameter (GSD), location of the placenta,

placental volume (PV), GSD/CRL ratio, PV/CRL ratio. Eccentric umbilical cord insertion at the placenta was considered an eccentricity greater than 50% of the radius of the placenta. With Duplex Color-Doppler were studied: resistance index (RI) and pulsatility index (PI) bilateral in the uterine arteries, presence or absence of protodiastolic notch. Some data were obtained by Double-test: fb-hCG (free beta-human chorionic gonadotropin), PAPP-A (pregnancy-associated plasma protein-A). MoM (multiple of the median) was calculated in each case. The Double-test "Cut-off" was 1:250 measured by PRISCA, nuchal fold was measured according to accepted guidelines. Biochemical data were obtained (Double-test) from 128 pregnant women in the first trimester of pregnancy. These data were included in the study as nested case-control study. The results were processed using T- test and Chi-test.

RESULTS: Body-mass index of the pregnant is positively correlated with the amount of amniotic fluid (GSD/CRL ratio), placental volume (PV/CRL ratio) at the end of the first trimester. Obesity appears to adversely affect decreasing of the impedance to flow in the uterine arteries with the evolution of pregnancy. Pregnancies after treated infertility showed a smaller amount of amniotic fluid and a lower placental volume at the end of the first trimester of pregnancy. Low PAPP-A values are significantly associated with lower placental volume (PV/CRL) and a smaller amount of amniotic fluid (GSD/CRL) at the end of the first trimester. There was a higher frequency of eccentric umbilical cord insertion in group with PAPP-A values <0.5 MoM versus PAPP-A >0.5 MoM group (OR=10.9, $p=0.002$). Pregnancies with a smaller amount of amniotic fluid at the end of the first trimester of pregnancy have a significantly higher risk for fetal malformation and second trimester spontaneous abortion. GSD/CRL ratio less than 10% (<1.04) reveals 30% of fetal malformations and 33% of second trimester spontaneous abortions with a false positive rate of 10%. Pregnancies with eccentric umbilical cord insertion at the placenta at the end of the first trimester also have a significantly higher risk for fetal malformation and second trimester spontaneous abortion. Eccentricity greater than 50% of the radius of the placenta reveals 60% of fetal malformations and 50% of second trimester spontaneous abortions with a false positive rate of 10%. Pregnancies with a lower placental volume at the end of the first trimester of pregnancy have a significantly higher risk for fetal malformation and second trimester spontaneous abortion. PV/CRL ratio less than 10% ($<4.7 \text{ cm}^2$) reveals 30% of fetal malformations and 50% of second trimester spontaneous abortions with a false positive rate of 10%. Pregnancies with higher placental volume (PV/CRL above 90%, $>11 \text{ cm}^2$) and low resistance in the uterine arteries (PI below 10%, <0.48) at the end of the first trimester of pregnancy have a significantly higher risk for fetal macrosomia. Pregnancies with smaller placental volume (PV/CRL below 10%, $<4.7 \text{ cm}^2$) and increased resistance in the uterine arteries (PI above 90%, >2.17) at the end of the first trimester of pregnancy have a higher risk for fetal intrauterine growth retardation.

CONCLUSIONS: Some biometrical, morphological and circulatory data at the end of the first trimester may help in the diagnosis of obstetric pathologies such as fetal malformations, second trimester spontaneous abortions, fetal macrosomia and intrauterine growth retardation.

Key words: PAPP-A, placental volume, amniotic fluid, eccentric cord insertion