THE HISTOMORPHOLOGIC AND DOPPLER SONOGRAPHY STUDY OF THE TROPHOBLASTIC INVASION IN THE HUMAN PLACENTATION

(Abtract)

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During human placentation sufficiently increased the blood flow to the placenta is made by spiral artery dilatation. The invasive trophoblast entirely leaves the fetal placenta, eroding the wall and opens to blood vessels areas of change, and then invade the peri-and intravascular areas of the spiral arteries in decidua and junctional myometrium.

Trophoblastic invasion of the spiral artery wall will result in destruction of musculo-elastic layer and its replacement by fibrinoid material. Lack of muscular layer spiral arteries will allow a maximum dilatation with decreased vascular resistance at this level and a maximum blood flow to the intervillozitar room. Histologically, the wall of spiral arteries includes the trophoblastic cell with together an amorphous acidophilous fibrinoid material. Musculoelastics structure is totally lost, and the bowl is reendotelizing, as spiral artery arises "changed physiology" or uteroplacental vessel, a process called conversion. It is believed that abnormal placentation by poor conversion of spiral arteries, could be the source of various pathological processes during pregnancy, including preeclampsia, intrauterine growth retardation, premature rupture of membranes, premature birth with intact membranes.

Uterine vascular changes may reveal Doppler flowmetry. Assessment of uterine artery velocimetry slope reflects maternal hemodynamics and placental vascular resistance of the entire territory supplied by that artery.

Because resistance changes can reveal much earlier than clinical signs - hypertension, intrauterine growth retardation – the flowmetry Doppler method can be used as a method for early detection of pathological conditions.

Our research includes a histomorfologic study of conversion spiral vessels in pregnant women with physiological and pathological pregnancies, correlated with Doppler examinations of uterine arteries (resistance and pulsatility indeces, persistence of protodiastolic incisures) to demonstrate causal links between poor conversion of spiral arteries, utero-placental ischemia and various pathological processes during pregnancy.

Histomorfologic study of trophoblastic invasion of the decidual and myometrial spiral arteries was performed in biopsy fragments taken from the placental bed and placenta and physiological tasks included in the first trimester and at term. I watched the physiological changes of the spiral arteries in the pregnancy, considered to be physiological, which were presented for abortion on demand, and that the conversion of spiral arteries taken from term pregnancies in healthy patients. The histological study included to the pathological pregnancies, which are presumed to be deficient trophoblastic invasion: preeclampsia, premature birth, premature rupture of membranes, and we investigated the differences in conversion of decidual and myometrial spiral arteries compared to those found in healthy patients.

We conducted a series of Doppler ultrasound in patients treated with a healthy and normal development of pregnancy in different periods of pregnancy and thus made a chart of
reference values. Doppler examinations were performed and in a group of patients with pathological pregnancies associated with poor trophoblastic invasion. Flowmetry results of patients with physiological pregnancy were compared with those of pathological pregnancy to determine any statistical significantly differences.

Correlating the results of histological and ultrasound examinations, we assess the causal relationship exists between an poor invasion and different obstetric pathologies, that the possibility of objectifying the poor invasion using Doppler flowmetry.

Histomorphological examinations were performed in 70 pregnant women through routine histological and immunohistochemical methods, following different degrees of trophoblastic invasion: full, partial and absence of invasion.

Flowmetry study was performed by Doppler ultrasound in 168 healthy pregnant women monitored by serial ultrasound in pregnancy (668 examinations), 23 healthy pregnant women who delivered by cesarean delivery and the placental bed biopsy was performed, respectively 251 patients with pathological pregnancies hospitalized for pregnancy-induced hypertension, intrauterine growth retardation, spontaneous preterm delivery and premature rupture of membranes, to 38 performing a biopsy during caesarean section.

Doppler indices in physiological pregnancies showed a marked decrease up to 25-26 weeks and then stabilized until the term. The persistence rate of protodiastolic incisures similar decreases and remains at a value of 5-6% by the term. Doppler parameters in pregnancies with preeclampsia and intrauterine growth retardation are significantly higher than physiological pregnancy, but with much higher values in patients with preterm birth. In patients with preterm delivery without hypertension flowmetry indices were higher than the normal development pregnancy, especially those born before 34 weeks. We found no significant differences between Doppler parameters in women with premature rupture of membranes and physiological pregnancy. Doppler parameters in pathological pregnancies primarily select the patients with more severe impairment: pre-eclampsia with fetal hypotrophy and premature delivery. Correlation of histological results with clinical data showed that patients with preeclampsia rates of arteries without invasion or poor trophoblastic invasion is significantly higher than normal pregnancy both the decidual segment of spiral arteries and in the myometrial as well. In the patients with preterm delivery statistical significantly differences are observed in the myometrial segment of the artery. Although the differences are not significantly statistical, we found several arteries with impaired trophoblastic invasion in the patients with premature ruptured of membranes.

Correlative analysis of vascular changes and Doppler parameters was performed following the values of and the persistent notch in depending on the degree of invasion the spiral arteries in the decidua and miometru. The results showed that Doppler indices are the greater the degree of invasion is low or missing. The frequency of the persistent notch correlates with the lack of invasion.

Our results allowed to conclude that:
1. In the physiological pregnancy most spiral arteries undergo a physiological transformation and changes in blood flow, a row this phenomenon can highlight using Doppler ultrasound

2. In the pathological pregnancy both the trophoblastic invasion is deficient clinical manifestations are more severe, Doppler parameters show that higher values

3. Calculation of normal values of resistance and pulsatility indeces that allows for useful in evaluating diagrams of pathological pregnancy.

4. Doppler ultrasonography to assess changes in parameters of spiral artery trophoblastic invasion due to physiological and pathological pregnancy and can be used in screening pathological pregnancies such as formulating a prognosis evolutionary.