

**ECHOGRAPHIC PREDICTION OF FETAL GROWTH RETARDATION
SYNDROME IN COMPLICATED PREGNANCY DURING A PANDEMIC**

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Annotation.

The article presents the effectiveness of Dopplerometry for assessing blood flow in large vessels, including the umbilical, uterine artery and middle cerebral artery, 90 women were examined in the second trimester, and 45 women showed signs of placental insufficiency, such as fetal growth restriction syndrome at 28-34 weeks. The results of the study showed that 23 (51.1%) women had signs of subcompensated insufficiency of uteroplacental blood flow, and 11 (24.4%) women showed signs of fetal-placental blood flow. The study of the uteroplacental-fetal blood flow allows early detection of early signs of impairment in the fetoplacental system and its timely correction.

Key words: Fetal growth restriction syndrome, dopplerometry, middle cerebral artery, umbilical artery.

Introduction.

Fetal growth restriction syndrome (FGRS) is an indicator of an increased risk of perinatal mortality and morbidity compared to those born with normal indicators. There is a significant difference in the incidence of FGRS in different populations. The incidence of FGRS also depends on economic growth, while in developed countries it is relatively lower (4-8%) compared to developing countries (6-30%) [1]. According to WHO, the average incidence of FGRS in the General population is up to 8%. In 35-40% of cases, the cause of FGRS is a pathological condition of the mother, which is a high risk, such as fetoplacental insufficiency, gestational hypertension, preeclampsia, cardiovascular diseases, diabetes, as well as low socio-economic status [2,4,6]. Many studies have found a close relationship between poor pregnancy outcomes and FGRS, i.e. more than half of stillbirths were associated with FGRS, and almost 10% of perinatal deaths were due to undetected FGRS [3, 5, 7].

As you know, the fetoplacental system is the only nutritional support for the fetus. During FGRS, the placenta's ability to provide the fetus with adequate nutrition is limited, which leads to problems with normal fetal development [9,11]. In this regard, improvement of utero-placental blood circulation is necessary for the continuation of a normal pregnancy. Normally, pregnancy progression is marked by a number of changes and adaptations in the vascular network of the mother, placenta, and fetus [8,10]. Failure to adapt to these changes leads to the development of abnormal vascular resistance in the utero-placental blood flow. This can consistently lead to a deterioration of the fetus and, ultimately, to FGRS [6]. Early detection and prediction of FGRS depends to a large extent on the ability to effectively and efficiently assess the Central and regional blood flow of the mother, placenta, and fetus.

The purpose of this study was to evaluate the usefulness of the Doppler index values for predicting FGRS.

Materials and methods: the study was conducted in the Department of pathology of pregnant women in the Bukhara city maternity hospital. A total of 90 pregnant women were recruited in the period 2019-2020 with clinical criteria for FGRS. The results of the clinical examination, obstetric Doppler study, and perinatal outcome were evaluated in only 45 women. The control group consisted of 25 pregnant women without signs of FGRS.

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Clinical criteria for selecting patients with suspected cases of FGRS included:

- a history of preeclampsia, gestational hypertension,
- cardiovascular diseases,
- chromosomal abnormalities of the fetus during the first pregnancy,
- cytomegalovirus and herpes simplex (TORCH) infection,
- advanced insulin-dependent diabetes mellitus,
- patients who have a longitudinal position, and the height of the bottom of the uterus that is less than the gestation period by three to four weeks.

The determination of gestational age was based on the most accurate estimates of the last menstrual date, as well as on ultrasound or routine fetal biometrics in the first or early second trimester.

Ultrasound was performed on a Voluson E9 Expert device using sensors with a frequency of 3.5 MHz. To use Doppler imaging, patients were first scanned in normal mode using B-mode. The vessels of interest were then confirmed using a color Doppler. The Doppler signal was then obtained by placing the Doppler gate directly above the test vessel. Flow rate curves were obtained during periods of fetal inactivity and apnea. A number of indices based on color Doppler flowmetry have been proposed to assess the risk of intrauterine development delay in ongoing pregnancy, including the umbilical artery (UA) and middle cerebral artery (MCA) pulsation and resistance index (PI and RI). In this study, an attempt was made to evaluate the effectiveness of these Doppler indices in our conditions during pregnancy at the beginning and end of the third trimester [4,7-9].

Results: the age of women included in the study ranged from 18 to 37 years, the average age was 26.13 ± 4.21 years.

The results show that uterine-fetal placental blood flow dopplerometry has moderate to high predictive accuracy for predicting perinatal death, which is the most important criterion for evaluating outcomes for utero-placental insufficiency in suspected FGRS. During the visits, the mean PI, RI, and SDR values for the umbilical artery were significantly higher in pregnant women with FGRS compared to those without FGRS. In the middle cerebral artery (MCA), the values of PI, RI, and SDR were significantly lower in pregnant women with FGRS, as compared to cases not associated with FGRS.

The results of Doppler studies obtained by us showed that the studied parameters of utero-placental-fetal blood flow in pregnant women with FGRS were changed in a negative direction compared to the control group. Data on the average values of Doppler parameters (PI, RI, SDO), and curves of utero-placental-fetal blood flow are presented in table 1.

Table 1.

Indicators of dopplerometry of utero-placental-fetal hemodynamics in the examined groups (M±m)

Investigated parameters	SDR	RI	PI
Main group n = 45			
Uterine arteries	2,36±0,05*	0,48±0,01	0,64±0,05
Artery of the umbilical	3,04±0,05*	1,72±0,02	1,06±0,05
Middle cerebral artery	3,09±0,05*	0,51±0,03	0,95±0,02
Control group n = 25			
Uterine arteries	2,18±0,02	0,39±0,05**	0,56±0,02o
Artery of the umbilical	2,65±0,05	1,11±0,02**	0,65±0,05o
Middle cerebral artery	4,65±0,02	0,74±0,01**	1,39±0,02o

* R0,05– reliable difference between the main group and the comparison group; ** P0,05–reliable difference between the comparison group and the control group; of r0,05– reliable difference between the main group and the control group

As can be seen from the table, the Doppler data reflected changes in the umbilical cord and MCA in pregnant women with FGRS. All indicators such as PI, IR, and SDR were increased by 1.5 times in the uterine and umbilical arteries.

IR for the uterine artery ranged from 0.48-0.65, for the umbilical artery to 0.64, and for the medial artery to 0.95. On the placenta attachment side, the uterine artery IR was always slightly lower. The ratio of the maximum systolic and diastolic velocities for these vessels ranged from 2.36, 3.04, and 3.09, respectively. PI values ranged from 0.64, 1.06, and 0.95 for the uterine artery, umbilical artery, and MCA, respectively. 23 (51.1%) women showed signs of subcompensated utero-placental insufficiency, 11 (24.4%) - fetal-placental blood flow.

Subcompensated insufficiency of blood flow in the bed of the corresponding vessels was expressed in an increase in vascular resistance indicators, exceeding their upper limit of permissible values.

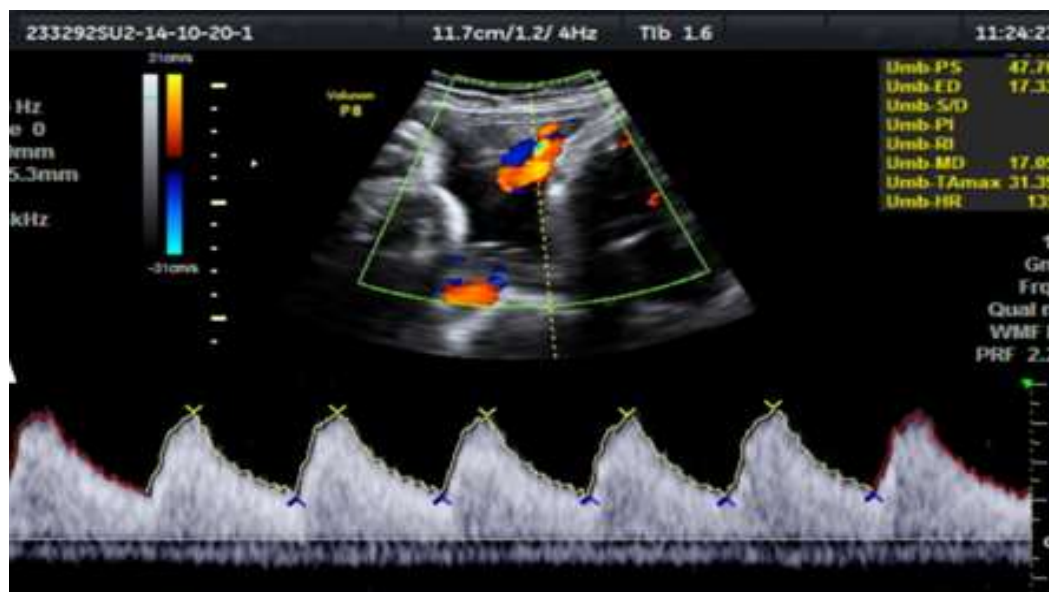


Figure 1.:
Umbilical
artery curve
at 32 weeks
gestation
showing
normal
diastolic blood flow.

The Doppler spectrum of abnormal blood flow in MCA was characterized by both a sharp decrease in the resistance index and its increase, the appearance of reverse blood flow. A significant decrease in peripheral blood flow resistance in the SMA was a compensatory mechanism, a reaction to deterioration of fetal-placental blood flow, and was considered an indirect sign of brain fullness, which also indicates a critical condition of the fetus.

Patients with a bilateral high resistance index (RI) and pulsation index (PI) or with an incision showed a significantly higher prevalence of small-for-gestational-age fetuses and intrauterine development delay (FGRS), which results in the birth of fetuses with low Apgar.

Conclusion.

Thus, based on the results of research, we can assume that the Doppler method is an early diagnostic marker for determining FGRS. The study of uteroplacental-fetal blood flow allows timely detection of a violation in the fetoplacental system. According to the results, abnormal Doppler parameters in the umbilical cord arteries and in the MCA are characteristic of the early stages of FGRS. In contrast, in the advanced stages of FGRS, abnormal Doppler indicators are characterized in the middle cerebral artery and with normal or minimally increased resistance in the umbilical cord arteries.

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