

DOI: 10.26693/jmbs07.03.087

UDC 618.3-005.1:618.32

Azizova N. A.

Analysis of Ultrasound Parameters in Pregnant Women with Retrochorial Hematoma

Scientific Research Institute of Obstetrics and Gynecology,
Baku, Azerbaijan Republic

The purpose of the study was to determine the parameters of ultrasound examination in patients with retrochorial hematoma in the early stages of pregnancy.

Materials and methods. Ultrasound examination was performed in 210 women in the early stages of pregnancy to study the features of the echographic parameters of embryo development during the formation of retrochorial hematoma. The main group consisted of 100 pregnant women with signs of early termination and diagnosed retrochorial hematoma. The comparison group consisted of 80 pregnant women with the threat of early termination, but without retrochorial hematoma. The control group included 30 conditionally healthy women with a physiological course of pregnancy. All groups were comparable in age and parity. During ultrasound scanning in the first trimester, the localization of the fetal egg, its size, thickness and echogenicity of the chorion, the diameter of the yolk sac and the echogenicity of its walls were evaluated, attention was paid to the location, volume, and duration of hematoma manifestation.

Results and discussion. Pregnant women with the threat of termination at the time of examination had clinical signs of threatening miscarriage. In the women of the main group with the formation of retrochorial hematoma in the first trimester, a certain clinical picture was observed: in 85.0% of cases – pain syndrome, in 71.0% – increased uterine tone and in 42.0% of cases – episodes of bloody discharge. In patients of the comparison group with the threat of termination of pregnancy, but without the formation of retrochorial hematoma, the incidence of pain syndrome was 86.3%, increased uterine tone – 77.5%, bleeding from the genital tract – 46.3%.

Pregnant women with retrochorial hematoma have a higher incidence of pathology of extraembryonic formations (chorion, yolk sac). Prognostically unfavorable ultrasound signs are the formation of a retrochorial hematoma up to 6 weeks, a delay in coccygeal-parietal size of the embryo for more than 7 days, corporeal localization and a large volume of hematoma, a violation of uterine blood flow.

Normal uterine blood flow was observed in all women of the control group. In patients of the comparison group, blood flow disorders were recorded in 29 (37.2%) women ($p=0.000$). In the main group of pa-

tients with retrochorial hematoma, uterine blood flow disorders were noted in 60 (60.0%) women ($p=0.000$).

Conclusion. Pregnant women with retrochorial hematoma in the first trimester have a higher incidence of pathology of extraembryonic formations (chorion, yolk sac). Prognostically unfavorable ultrasound signs are the formation of a retrochorial hematoma up to 6 weeks, a delay in coccygeal-parietal size of the embryo for more than 7 days, corporeal localization and a large volume of hematoma, a violation of uterine blood flow.

Keywords: pregnancy, retrochorial hematoma, ultrasound examination.

Introduction. Retrochorial hematoma is the most common cause of bleeding in the first trimester of pregnancy and occurs in up to 22% of all pregnancies [1, 2]. From 9% to 24% of pregnancies with retrochorial hematoma end in miscarriage [3]. In the case of prolonged pregnancy, the risk of maternal and neonatal complications increases: premature birth, intrauterine development delay, placental abruption, preeclampsia and others [4, 5].

The formation of retrochorial hematoma can also be caused by a number of diseases, among which there are various inflammatory and infectious diseases, some autoimmune diseases, as well as pathologies of the body's coagulation system [6]. Due to the continuing urgency of the problem of threatened miscarriage in the first trimester of gestation, especially in combination with retrochorial hematoma, the study of the causes, mechanisms, ways of predicting and treating this pathology continues.

To assess the parameters of embryo formation and extraembryonic structures, the features of fetoplacental complex formation, fetal hemodynamics in complicated pregnancy, ultrasound examination is used, which determines the diameter of the fetal egg, its size, allows to study the anatomical and functional state of the embryo in accordance with the gestation period. Ultrasound examination is the main diagnostic method for patients with retrochorial hematoma [7].

The purpose of the study was to determine the parameters of ultrasound examination in patients with retrochorial hematoma in the early stages of pregnancy.

Materials and methods. To study the features of the echographic parameters of embryo development during the formation of retrochorial hematoma, an ultrasound examination was performed in 210 women in early pregnancy who applied to the Republican Clinical Hospital of the Ministry of Health of the Republic of Azerbaijan. The main group consisted of 100 pregnant women with signs of early termination and diagnosed retrochorial hematoma. The comparison group consisted of 80 pregnant women with the threat of early termination, but without retrochorial hematoma. The control group included 30 conditionally healthy women with a physiological course of pregnancy. All groups were comparable in age and parity. The average age of pregnant women in the main group was 27.1 ± 0.4 years, the comparison group – 28.2 ± 0.6 years, the control group – 28.1 ± 0.9 years. The reason for the patients' treatment was a burdened obstetric history, spotting from the vagina, pulling pains in the lower abdomen or a planned visit to the doctor within 3–16 weeks (on average – 8.0 ± 0.2 weeks), during which the hematoma was an ultrasound finding.

The criteria for inclusion in the main group of the study were: pregnancy period from 6 to 12 weeks; threatening miscarriage at the time of inclusion in the study, manifested by pain in the lower abdomen and lower back, the presence of retrochorial hematoma according to ultrasound; viable embryo, a positive attitude of a woman to prolong pregnancy. Exclusion criteria were abnormalities of embryo development, severe extragenital diseases of the mother, which are contraindications for prolongation of pregnancy, infectious diseases.

The echographic study was carried out on the SonoScape 6 device (PRC) with sensors with a frequency of 3.5–7.0 MHz according to generally accepted standardized methods. During ultrasound scanning in the first trimester, the localization of the fetal egg, its size, thickness and echogenicity of the chorion, the diameter of the yolk sac and the echogenicity of its walls were evaluated. Attention was paid to the location, volume, and duration of hematoma manifestation. The volume of the hematoma was calculated by the formula $V=(A \times B \times C):2+5\%$ (where A, B, C are the maximum dimensions in three mutually perpendicular cavities).

During the research, the provisions of the Helsinki Declaration of the World Medical Association "Recommendations for doctors engaged in biomedical research with human participation" were observed. All the participants were informed about the goals, organization, methods of examination and signed an informed consent to participate in the completely anonymous study.

The assessment of statistical significance was verified using the IBM Statistics SPSS-26 program. Statistical processing of the obtained results was carried out using the MS EXCEL2019 statistical analysis program. The arithmetic mean (M) and arithmetic mean error (m) were determined. The reliability of the differences between the groups was determined by the Student's t-criterion, for small and heterogeneous groups – by the Mann-Whitney U-criterion, the Spearman correlation coefficient was calculated. Generally accepted significance levels were used – $p < 0.05$, $p < 0.01$ and $p < 0.001$.

Research results and discussion. Pregnant women with the threat of termination at the time of examination had clinical signs of threatening miscarriage. In the women of the main group with the formation of retrochorial hematoma in the first trimester, a certain clinical picture was observed: in 85.0% of cases – pain syndrome, in 71.0% – increased uterine tone and in 42.0% of cases – episodes of bloody discharge. In patients of the comparison group with the threat of termination of pregnancy, but without the formation of retrochorial hematoma, the incidence of pain syndrome was 86.3%, increased uterine tone – 77.5%, bleeding from the genital tract – 46.3%.

Absolute ultrasound markers of the threat of termination of pregnancy were found in all patients of the main group and the comparison group. The gestation period in patients of the control group was 7.2 ± 0.4 weeks, in patients of the comparison group – 7.9 ± 0.3 weeks, in patients of the main group – 8.2 ± 0.2 weeks. The calculation of the gestation period was determined on the basis of biometric indicators.

Of great importance is the gestation period at which retrochorial hematoma was first detected [8]. Retrochorial hematoma before 6 weeks was detected in 13 (13.0%) patients, after 6 weeks – in 87 (87.0%) patients of the main group. The detection of retrochorial hematoma before 6 weeks of pregnancy was a negative factor of early reproductive losses in 11 (11.0%) women, which coincides with the results obtained earlier by other authors [9].

During the ultrasound description of the chorion, its localization and structure were detailed. In the control group, the variant of chorion localization in the bottom region was most often observed – in 80% of cases of observations ($n=24$). Against the background of pathology, the most frequent variant of the chorion location was also noted in the bottom area: in 55.0% of cases of observations ($n=55$) in the main group and in 75.0% of cases of observations ($n=60$) in the comparison group.

In the control group, the localization of the chorion along the anterior wall was 6.7% ($n=2$), along the posterior wall – 10.0% ($n=3$), in the area of the inner

pharynx – 3.3% of observations (n=1). In the comparison group, the localization of the chorion along the anterior wall was 10.0% (n=8), along the posterior wall – 13.8% (n=11), in the area of the inner pharynx – 1.3% of observations (n=1). In the main group, the localization of the chorion along the anterior wall was 8.0% (n=8), along the posterior wall – 31.0% (n=31), in the area of the inner pharynx – 6.0% of observations (n=6).

As can be seen from the data obtained, in patients of the main group with retrochorial hematoma, placentation in the area of the internal pharynx prevailed in comparison group over patients of other observation groups ($\chi^2=15.008$; $p=0.02$), which casts doubt on the physiological nature of the course of the first trimester of pregnancy with the development of retrochorial hematoma in women. For the other variants of the chorion arrangement, a significant level of difference was not observed ($p>0.05$) (Figure).

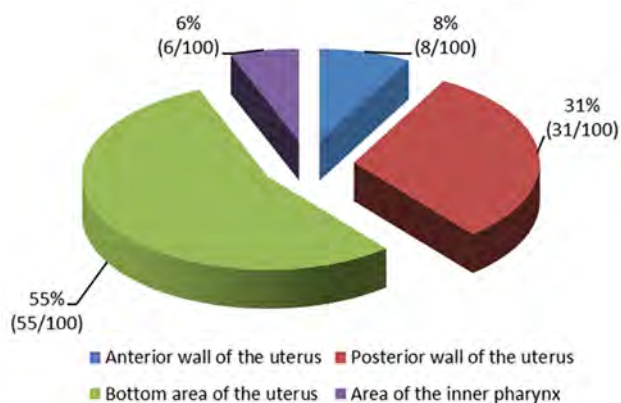


Figure. The frequency of chorion localization in patients with retrochorial hematoma (n=100)

The next echographic feature is the structure of the chorion, which in patients of the control group was unchanged in 100.0% of observations. In the comparison group, the chorion structure was unchanged in 78 (97.5%) patients, fragmented – in 2 (2.5%) patients ($p=0.538$). In 95 (95.0%) pregnant women of the main group, the chorion structure was unchanged, in 5 (5.0%) – fragmented ($p=0.213$).

The yolk sac was visualized in 6 (20.0%) pregnant women of the control group, in 19 (23.8%) of the comparison group and in 9 (9.0%) patients of the main group. According to this indicator, a statistically significant difference was observed between the patients of the main group and the comparison group ($p=0.007$). The average internal diameter of the yolk sac in the control group was 28.6 ± 4.0 mm, in the comparison group – 27.9 ± 2.9 mm, in the main group – 38.9 ± 2.3 mm. Statistically significant differences in this indicator were noted between the main group and the control ($p=0.012$) group, the main group and the comparison group ($p=0.000$).

An ultrasound sign of retrochorial hematoma is the detachment of the chorion from the walls of the uterus. Ultrasound examination of the periphery of the fetal egg visualizes a hypoechoic or hyperechoic area between the decidual membrane and the chorion. The volume, structure and localization of retrochorial hematoma were determined using ultrasound data.

Retrochorial hematomas of various localization were diagnosed in all pregnant women of the main group during ultrasound. A variant of corporeal hematoma localization was more often observed – in 74.0% of cases (n=74). Supracervical variant of hematoma localization was observed in 26 patients (26.0%) of the main group.

Comparison of clinical symptoms with ultrasound echography data made it possible to identify the following features of the course of pregnancy. Thus, the symptoms of a threatening miscarriage, manifested by pain in the lower abdomen, were the most characteristic of a corporally located hematoma. In turn, supracervical detachment of the chorion was accompanied mainly by spotting bloody discharge from the genital tract.

The localization of retrochorial hematoma affects the severity of gestation complications. Cases of habitual abortion were indicated by 17 (56.7%) patients with corporeal hematoma localization and 13 (43.3%) women with supracervical localization ($\chi^2=7.732$; $p=0.052$). Calculation of the Spearman coefficient showed a direct correlation between cases of habitual abortion and hematoma localization ($r_s=0.260$; $p=0.009$).

In addition to visualizing the hematoma itself, its volume is important for predicting outcomes and correctly assessing the clinical situation. By volume, retrochorial hematomas were classified as small (up to 1.5 cm^3) and large (more than 1.5 cm^3). 73 (73.0%) patients had hematomas of small volume. Large-volume hematomas were detected in 27 (27.0%) patients. It is important to note that large hematomas were by 8.0 times more common in repeat pregnant women than in first-time pregnant women – in 24 (34.8%) versus 3 (9.7%) ($\chi^2=6.840$; $p=0.009$). The calculation of the Spearman coefficient showed a direct correlation between the number of pregnancies and the size of the hematoma ($r_s=0.262$; $p=0.009$).

The characteristics of the structure of retrochorial hematoma showed that in 94 (94.0%) patients the hematoma was with signs of organization, in 6 (6.0%) – it was an anechoic formation. The calculation of the Spearman coefficient showed a direct correlation between the number of pregnancies ($r_s=0.250$; $p=0.012$), the number of births ($r_s=0.273$; $p=0.006$), the number of abortions ($r_s=0.198$; $p=0.049$), the presence of artificial abortions ($r_s=0.291$; $p=0.003$), the presence of

habitual abortions ($rs=0.238$; $p=0.017$) and the structure of the hematoma.

An important aspect of predicting the course of pregnancy in the early stages is a violation of the growth of the embryo / fetus. Normally, the measurement data of the coccygeal-parietal size of the embryo (CT) during the physiological course of pregnancy correspond to the gestation period or lag behind it by no more than 6 days in the presence of a regular menstrual cycle. The analysis of the results showed that the delay of CT from normal values for 7 or more days was observed in 7 (23.3%) pregnant women of the control group, 24 (30.0%) of the comparison group and 28 (28.0%) patients of the main group. The parameters of the CT values in the observation groups were: in the control group – 28.3 ± 5.0 mm, in the comparison group – 25.1 ± 3.4 mm, in the main group – 31.4 ± 3.1 mm. In the main group of pregnant women, a decrease in embryo CT in 75.0% ($n=21$) of observations was noted in combination with corporeal, and in 21.0% ($n=7$) – with supracervical hematoma localization. In 39.3% ($n=11$) of patients, a decrease in embryo CT was observed with an increase in hematoma volume, which may indicate early intrauterine growth retardation of the embryo. In 17 (60.7%) cases, a decrease in CT values was noted with small hematoma sizes. In 27 (96.4%) patients, a decrease in embryo CT values was observed with an organized hematoma, and in 1 (3.6%) case – with a hematoma without signs of organization.

Cardiac activity is also an important indicator of embryo development. In the control group, the number of heart contractions of the embryo corresponded to the parameters of a physiologically proceeding pregnancy and averaged 155.3 ± 5.6 beats/min. In the comparison group, the embryo's heart rate was 147.6 ± 4.2 beats/min. In the main group, the embryo's heart rate was equal to 153.2 ± 2.9 beats/min.

Normal uterine blood flow was observed in all women of the control group. In patients of the comparison group, blood flow disorders were recorded in 29 (37.2%) women ($p=0.000$). In the main group of patients with retrochorial hematoma, uterine blood flow disorders were noted in 60 (60.0%) women ($p=0.000$).

Conclusion

1. Pregnant women with retrochorial hematoma in the first trimester have a higher incidence of pathology of extraembryonic formations (chorion, yolk sac).
2. Prognostically unfavorable ultrasound signs are the formation of a retrochorial hematoma up to 6 weeks, a delay in CT for more than 7 days, corporeal localization and a large volume of hematoma, a violation of uterine blood flow.

Perspectives of further research. The study of ultrasound indicators of the formation of retrochorial hematoma in the early stages of pregnancy is relevant for the purpose of its further prolongation and the birth of healthy offspring.

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UDC 618.3-005.1:618.32

АНАЛІЗ ПОКАЗНИКІВ УЛЬТРАЗВУКОВОГО ДОСЛІДЖЕННЯ У ВАГІТНИХ З РЕТРОХОРИАЛЬНОЮ ГЕМАТОМОЮ

Азізова Н. А.

Резюме. *Мета:* визначення показників ультразвукового дослідження у пацієнток із ретрохоріальною гематомою на ранніх термінах вагітності.

Матеріал та методи дослідження. Проведено ультразвукове дослідження у 210 жінок на ранніх термінах вагітності. Основну групу склали 100 вагітних із ознаками загрози переривання на ранніх термінах та діагностованою ретрохоріальною гематомою. Групу порівняння склали 80 вагітних із загрозою переривання на ранніх термінах, але без ретрохоріальної гематоми. До контрольної групи увійшли 30 умовно здорових жінок із фізіологічним перебігом вагітності. Причиною звернення пацієнток до лікаря був обтяжений акушерський анамнез, кров'яні виділення з піхви, тягучі болі внизу живота, або плановий візит до лікаря в терміни 3-16 тижнів (в середньому - $8,0 \pm 0,2$ тиж), під час якого гематома була ультразвуковою знахідкою.

Результати. У вагітних із загрозою переривання на момент обстеження відзначалися клінічні ознаки загрозового викидня. Проведення ультразвукового сканування в I триместрі виявило локалізацію плодового яйця, його розміри, товщину та ехогенність хоріону, діаметр жовткового мішка та ехогенність його стінок, розташування, об'єм, термін появи ретрохоріальної гематоми.

Виявлення ретрохоріальної гематоми до 6 тижнів вагітності стало негативним фактором ранніх репродуктивних втрат. Локалізація ретрохоріальної гематоми впливає на тяжкість ускладнень гестації. На випадки звичного абортів вказували 17 (56,7%) пацієнток із корпоральною локалізацією гематоми, та 13 (43,3%) жінок із супрацервікальною локалізацією ($\chi^2=7,732$; $p=0,052$). Обчислення коефіцієнта Спірмена показало пряму кореляцію між випадками звичного абортів та локалізацією гематоми ($r_s=0,260$; $p=0,009$).

Висновки. У вагітних з ретрохоріальною гематомою у першому триместрі відзначено більш високу частоту патології екстраембріональних утворень (хоріону, жовткового мішка). Прогностично несприятливими ультразвуковими ознаками є формування ретрохоріальної гематоми до 6 тижнів, відставання КТР понад 7 днів, корпоральна локалізація та великий обсяг гематоми, порушення маткового кровотоку.

Ключові слова: вагітність, ретрохоріальна гематома, ультразвукове дослідження.

ORCID and contributionship:

Naila Akh. kizi Azizova : A-F

A – Work concept and design, B – Data collection and analysis,
C – Responsibility for statistical analysis, D – Writing the article,
E – Critical review, F – Final approval of the article

CORRESPONDING AUTHOR

Naila Akh. kizi Azizova

Republican Clinical Hospital named after Academician Mirgasimov
Ministry of Health of the Republic of Azerbaijan
762, Abbas Mirza Sharifzade Str., Yasamal, Baku AZ1012, Azerbaijan
tel: +994518928144, e-mail: statya2021@yandex.ru

The authors of this study confirm that the research and publication of the results were not associated with any conflicts regarding commercial or financial relations, relations with organizations and/or individuals who may have been related to the study, and interrelations of coauthors of the article.

Стаття надійшла 21.04.2022 р.

Рекомендована до друку на засіданні редакційної колегії після рецензування