

**MINISTRY OF HEALTH OF UKRAINE
ODESSA NATIONAL MEDICAL UNIVERSITY**

Faculty International

Department of Obstetrics and Gynecology



CONFIRMED by
Vice-rector for scientific and pedagogical work
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**METHODICAL DEVELOPMENT FOR A PRACTICAL LESSON
IN ELECTIVE DISCIPLINE**

Faculty International, 6th year

Elective discipline "ULTRASOUND DIAGNOSTICS IN OBSTETRICS AND
GYNECOLOGY"

Practical lesson No8. Topic: "Ultrasound assessment of the fetal state of the fetus."

Methodical development Practical Classes, OPP "Medicine", 6th year, medical Faculty. Custom
Discipline: «Ultrasound diagnostics in obstetrics and gynecology»

Approved:

Meeting of the Department of Obstetrics and Gynecology
Odessa National Medical University

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Practical lesson No 8

Topic: "Ultrasound assessment of the fetal state of the fetus."

Objective: To understand the relevance of the problems of hereditary and congenital pathology, primarily congenital malformations (CRA), as well as chromosomal and monogenic diseases. Identify and assimilate the main indications for prenatal ultrasound screenings. Teach meto evaluate ultrasound images during ultrasound diagnostics of pregnancy. Learn The main ultrasonic characteristics markers of congenital pathology during ultrasound screenings. Learn the patient's examination plan during the first (11-14 weeks) and second screening (19-22 weeks) pregnancy, the third screening (30-32 weeks).

Basic concepts: Ultrasound evaluation of markers of congenital pathology during pregnancy screenings: basic concepts and indications. Examination process during ultrasound screening: the first (11-14 weeks), the second (19-22 weeks) and the third (30-32 weeks). Osonic characteristics markers of congenital pathology during ultrasound screenings. A survey plan and parameters during ultrasound screenings are necessary.

Equipment: Professional algorithms, structural and logical schemes, tables, dummies, video-photo materials of ultrasound results, results of laboratory and instrumental studies, situational tasks, patients, medical histories.

I. Organizational measures (greetings, checking those present, communicating the topic, the purpose of the lesson, the motivation of higher education students to study the topic).

The antenatal period is important for the further condition of the fetus in childbirth and the development of the newborn. During pregnancy and childbirth, the fetus, placenta and amniotic fluid represent a single functional system – the fetoplacental complex. Assessment of his condition to a large extent allows us to reach a conclusion about the course of pregnancy, the presence of deviations in the development of the fetus, to predict the outcome of childbirth for the newborn

Improvement and widespread introduction into clinical practice of modern methods for assessing the state of fetal development opens up opportunities for improving the diagnosis and determination of optimal obstetric tactics in order to reduce perinatal morbidity and mortality.

- **Control of the reference level of knowledge (written work, written testing, online testing, frontal survey, etc.).** Requirements for knowledge:

- communication and clinical examination skills of the patient;
- ability to determine the list of necessary clinical, laboratory and instrumental studies and evaluate their results;
- the ability to prescribe appropriate management tactics for suspicious or abnormal ultrasound screening results. List of didactic units:
- Placentometry
- Fetometry
- Biophysical profile of the fetus
- Amniotic fluid level

2.2. Questions (test tasks, tasks, clinical situations) to test basic knowledge on the topic of the lesson.

Question:

- Ultrasound evaluation of markers of congenital pathology during pregnancy screenings: basic concepts and indications.
- Determination of the main parameters during the first ultrasound screening (11-14 weeks).
- Determination of the main parameters during the second (19-22 weeks) ultrasound screening.
- Determination of the main parameters during the third (30-32 weeks) ultrasound screening.
- An examination plan and parameters for ultrasound screenings are required.
- Threshold indicators of screening and determination of tactics for further pregnancy.

Situational tasks:

Problem 1.

Task:

Diagnosis. The main reasons are delayed fetal development. Your next steps.

Answer:

Test tasks:

- The most objective criterion for assessing fetal distress in childbirth:
 - The number of fetal movements.
 - Auscultation.
 - Cardiotocography.

- ULTRASOUND.
- Determination of the pH of blood taken from the anterior part of the fetus.
- The most effective method for the prenatal diagnosis of congenital malformations of the musculoskeletal system: A. Ultrasound.
- Determination of AFP in the serum of a pregnant woman.
- Ultrasound examination and determination of AFP.
- Amniocentesis. E. Choriocentesis.

- Examination method that poses minimal risk to the fetus: A. Amnioscopy.
 - Biopsy of chorionic villi.
 - Dopplerometric study.
 - Cordocentesis.
 - Amniocentesis

Correct answers: 1 – B.; 2 – A; 3 – C.

3. Formation of professional skills and abilities (mastering skills, conducting curation, determining the treatment regimen, conducting laboratory research, etc.).

— **The content of the tasks (tasks, clinical situations, etc.).**

Interactive task:

Students of the group are divided into 3 subgroups in the amount of 4-5 people each. We work in ultrasound diagnostic rooms with pregnant patients, we give tasks:

And subgroupsa – assessment of the patient, history taking

Ii subgroup – advising the patient according to ultrasound screenings

Subgroup III – evaluates the correctness of the answer of the I and II subgroups and makes its own adjustments.

Clinical tasks:

Problem 1.

At the reception at the gynecologist, a pregnant woman is 28 years old. During an ultrasound examination, pregnancy was diagnosed for 6 weeks, 4 days, which is progressing. From the history of a woman – pregnancy is desirable, the second, first pregnancy ended in childbirth on time, the child was diagnosed with multiple congenital malformations and a normal karyotype.

Task: Determine the tactics of the doctor and make a plan of diagnostic studies

Answer: Detailed fetal ultrasound and determination of biophysical profile markers

Test tasks:

- A pregnant woman of 23 years with low localization of the placenta with a gestational age of 34 weeks entered the department of obstetric pathology. A comprehensive examination revealed that there are signs of fetoplacental insufficiency. What disorders of the fetoplacental complex can be considered diagnostically significant in this situation?
 - Delayed intrauterine development of the fetus
 - Evaluation of the biophysical profile of the fetus
 - Positive non-stress test
 - The presence of deceleration on the cardiogram of the fetus
 - Duration of active respiratory movements of the fetus for 45 seconds

- Pregnant A., 23 p. Pregnancy 36 weeks. Received complaints of increased movements of the fetus, disturbing for 3 days. Ob-no: The size of the abdomen corresponds to 34 weeks. pregnancy, conclusion of ultrasound: the size of the fetus corresponds to 34 tons, signs of aging of the placenta (petrificates, lacunae), amniotic fluid – opalescent.
 - Repeated ultrasound after 2 weeks
 - Amniocentesis C. Amnioscopy
 - Biophysical profile of the fetus, dopplerometry of fetoplacental circulation.
 - Cordocentesis

Correct answers: 1 – A, 2 – D.

— **Recommendations (instructions) for the implementation of tasks (professional algorithms, orientation maps for the formation of practical skills and abilities, etc.).**

When screening in the III trimester (30-34 weeks) of pregnancy, fetal maturity is assessed, which is especially important when assuming or needing premature birth. Echography performed during this period allows you to diagnose fetal ZVUR, which makes it possible to choose the optimal timing and methods of delivery.

Today, ultrasound is widely used in the first trimester of pregnancy to confirm pregnancy and find out the nature in its development. Dynamic echographic observation of the development of pregnancy reveals its increase every week by 0.6-0.7 cm. The assessment of the viability of the fetus is based on the registration of its cardiac activity and mobility. Embryo movements are detected from the 7-8th week. The use of ultrasound allows you to diagnose multiple pregnancies already in the first trimester .

Ultrasonic fetometry is widely used.

Fetometry is the measurement of various anatomical structures of the fetus.

Comparison of the results obtained with the standard values for a given period allows us to clarify the gestational age, assess the rate of growth of the fetus, and diagnose ZVUR.

The main indicators of fetometry include:

- Biparietal size (BPD) of the fetal head
- Femur length
- Average diameter of the abdomen

Intrauterine growth retardation syndrome (ZVUR, or delayed fetal growth, according to ICD-10) is a slowdown in the growth and development of the fetus, which manifests itself at birth with insufficient body weight and low morphological indicators of maturity relative to gestational age. Biometric methods are used to diagnose ZVUR: determination of the height of standing of the bottom of the uterus in the II–III trimesters of pregnancy on the basis of a gravidogram (normally, by the 30th week, the increase in the height of standing of the bottom of the uterus is 0.7–1.9 cm per week, in 30–36 weeks – 0.6–1.2 cm per week, in 36 weeks and more – 0.1–0.4 cm; a lag in size by 2 cm or the absence of weight gain for 2–3 weeks with dynamic observation gives reason to suspect ZVUR), ultrasonic fetometry, which involves determining the size of the glans, abdominal circumference and fetal length. In case of inconsistency of one or more basic fetometric indicators of gestational age, extended fetometry is performed and the ratio of fronto-occipital size to biparietal, head circumference to abdominal circumference, biparietal size to thigh length, hip length to abdominal circumference is calculated. The most valuable indicator is the projected body weight of the fetus.

According to ultrasound, there are three degrees of severity of ZVUR:

– I degree – lag in fetometry indicators by 2 weeks from the gestational period; – II degree – lag by 3-4 weeks from the gestational period; – III degree – lag by more than 4 weeks.

Fetometry is informative from the 20th week of pregnancy.

The widespread use of ultrasound screenings allows timely detection of emerging malformations.

To increase the diagnostic and prognostic accuracy of the methods used to study the condition of the fetus, they are evaluated in combination with the determination of BPP by five variable components (significant movements of the fetal body, respiratory movements, fetal tone, non-stress test, volume of amniotic fluid).

Оцінювання показників БПП (F. A. Manning)

Параметри	Бали		
	2	1	0
НСТ (реактивність серцевої діяльності плода після його ворушіння за даними КТГ)	5 і більше акцелерацій, ЧСС з амплітудою не менше ніж 15 за 1 хв, тривалістю не менше ніж 15 с, пов'язані з рухами плода, протягом 20 хв спостереження	2–4 акцелерації, ЧСС з амплітудою не менше ніж 15 за 1 хв, тривалістю не менше ніж 15 с, пов'язані з рухами плода, протягом 20 хв спостереження	1 акцелерація або відсутність її протягом 20 хв спостереження
Дихальні рухи плода (ДРП)	Не менше одного епізоду ДРП тривалістю 60 с і більше протягом 30 хв спостереження	Не менше одного епізоду ДРП тривалістю від 30 до 60 с протягом 30 хв спостереження	ДРП тривалістю до 30 с або їх відсутність протягом 30 хв спостереження
Рухова активність плода	Не менше 3 генералізованих рухів протягом 30 хв спостереження	1 або 2 генералізованих рухи протягом 30 хв спостереження	Відсутність генералізованих рухів
Тонус плода	Один епізод і більше розгинань із поверненням у згинальне положення хребта та кінцівок протягом 30 хв спостереження	Не менше одного епізоду розгинання із поверненням у згинальне положення за 30 хв спостереження	Кінцівки в розгинальному положенні
Об'єм навколоплідних вод	Вертикальний діаметр вільної ділянки вод 2 см і більше	Вертикальний розмір вільної ділянки вод більше 1 см, але не менше 2 см	Тісне розташування дрібних частин плода, вертикальний діаметр вільної ділянки менше 1 см
Оцінка БПП	7–10 балів – задовільний стан плода; 5–6 балів – сумнівний тест; 4 бали і менше – патологічна оцінка БПП		

Obstetric tactics are chosen taking into account the signs of fetal maturity and the degree of readiness for childbirth. A score of up to 3 points indicates an unfavorable prognosis for the fetus. In this case, immediate delivery is required.

Ultrasonic placentometry is also informative. After establishing the place of attachment of the placenta, the area where it has the largest size is sought, which is determined. The thickness of the placenta is most accurately measured when a clear image of the chorial plate is obtained. The placenta is characterized by a typical growth curve, its thickness continuously grows up to 36-37 weeks of pregnancy. By this time, the growth of the placenta stops and, later, during the physiological course of pregnancy, the thickness of the placenta either decreases or remains at the same level, amounting to 35-36 mm. Depending on the pathology of pregnancy, the lack of placental function is manifested by a decrease or increase in the thickness of the placenta. Thus, the "thin" placenta (up to 20 mm in the third

trimester of pregnancy) is characteristic of late gestosis, the threat of abortion, fetal hypotrophy, while in hemolytic disease and diabetes mellitus, a "thick" placenta (up to 50 mm or more) indicates PN. However, both types of placental insufficiency can be detected in pathology' pregnancy. Thinning or thickening of the placenta by 5 mm or more indicates the need for therapeutic measures and requires repeated ultrasound. To identify compensatory changes in the placenta and to judge the effectiveness of the therapy, it is also important to determine the area of the placenta.

Doppler study of blood flow. With the help of ultrasound waves, the speed of blood flow in the uterine vessels, in the umbilical cord artery, in the aorta and inside is measured. carotid artery of the fetus. MSSHK,KDSHK-ratio. KDSHK decreases with an increase in peripheral vascular resistance, the ratio increases (with pathology). Dopplerometry of the blood flow rate in the umbilical cord artery (reflects the state of microcirculation in the fetal part of the placenta, the vascular resistance of which plays a major role in fetoplacental hemodynamics). The main attention is paid to the maximum systolic velocity (reflects the contractile activity of the heart) and the final diastolic (recognized as peripheral vascular resistance). Based on the ratio of these indicators, the pulsation index, the resistance index (IP) and systolic-diastolic dorm. Examine the blood flow in the uterine arteries, vessels of the umbilical cord, aorta, internal carotid artery of the fetus. An increase in IP in the aorta while decreasing in the internal carotid artery indicates the centralization of blood circulation in conditions of hypoxia.

Diagnostic criteria:

Normal blood flow is a high diastolic component on a Doppler with respect to isoline, the ratio of the amplitude of systole to diastole, is no more than 3.

3. Pathological blood flow :

Slow blood flow – a decrease in the diastolic component, the ratio of the amplitude of systole to diastole, is more than 3.

Terminal blood flow (indicates a high probability of antenatal fetal death): **zero – blood** flow in the diastole phase stops (there is no diastolic component on the Dopplerogram); **negative (reverse, reverse) - the** blood flow in the diastole phase acquires the opposite direction (on the Doppler table, the diastolic component is below the isoline)

— **Requirements for the results of work, including registration.**

- Consult a pregnant woman.
- Explain the need for a biophysical profile of the fetus to a pregnant woman.

- Assess the condition of the fetus and the nature of the contractile activity of the uterus on the basis of cardiotocography.
- To evaluate the results of determining the indicators of the biophysical profile of the fetus.
- Determine the further tactics of managing a pregnant woman and the need to prescribe a laboratory examination.

— **Control materials for the final stage of the lesson: tasks, tasks, tests, etc.**

Withituation problems:

The first pregnant woman turned to the maternity ward in the direction of a doctor of the residential complex. He has been on dispensary registration for pregnancy since 10 weeks. In agitation first, 3 2 weeks of days, there are no complaints. Obstetric status: the uterus is in normal tone, corresponds to the gestational age, abdominal circumference (coolant) is 96 cm, the height of the bottom of the uterus (VDM) is 32 cm. The position of the fetus is longitudinal, the head is palpated above the entrance to the pelvis. The fetal heartbeat is clear, rhythmic, 142 beats/min, listened to on the right near the navel. Fetal movement feels good. In a general blood test: hemoglobin (Hb) — 108 g/l, leukocytes — $7 \times 10^9/l$, erythrocyte sedimentation rate (ESR) — 12 mm/h. In urine analysis: from nasal density — 1015, protein — 0.033 g/l, leukocytes 0–2 in the field of view, erythrocytes 1–2 in the field of view.

Question

Determine diagnosis. Enter the list of examinations of the pregnant woman.

Answer.

Pregnancy first, 32 weeks. The longitudinal position of the fetus, the main presentation, the second position, the front view. Necessary examinations: examination and palpation of the mammary glands, examination of the lower extremities for the presence of varicose veins, auscultation of fetal heart rate; measure blood pressure, pulse, body temperature, VDM with the entry of data into the gravidogram; urinalysis or rapid test for the presence of protein, blood for antibodies with Rh-negative blood supply. Ultrasound is determined individually.

Test tasks KROK-2 (2019):

Ultrasound examination in obstetrics allows you to evaluate:

- A. The location of the placenta, its size and structure.
- Anatomy of the fetus.
 - Non-developing pregnancy.

- Congenital malformations of the fetus.
- All of the above. *

4. Summing up (criteria for evaluating learning outcomes).

Current control: oral questioning, testing, evaluation of practical skills, solving situational clinical problems, evaluation of activity in the classroom , etc. *The structure of the current assessment in the practical lesson:*

- Evaluation of theoretical knowledge on the topic of the lesson:
 - methods: survey, solving a situational clinical problem;
 - The maximum score is 5, the minimum score is 3, the unsatisfactory score IS 2.
- Assessment of practical skills and manipulations on the topic of the lesson:
 - methods: assessment of the correctness of practical skills;
 - The maximum score is 5, the minimum score is 3, the unsatisfactory score IS 2.
- Evaluation of work with the patient on the topic of the lesson:
 - Methods: assessment: a) communication skills of communication with the patient, b) the correctness of the appointment and evaluation of laboratory and instrumental studies, c) compliance with the algorithm for conducting a differential diagnosis d) justification of the clinical diagnosis, e) drawing up a treatment plan;
 - The maximum score is 5, the minimum score is 3, the unsatisfactory score IS 2.

Criteria for the current assessment in a practical lesson:

Score	Evaluation criteria
«5»	The student is fluent in the material, takes an active part in the discussion and solution of a situational clinical problem, confidently demonstrates knowledge of ultrasound screening diagnostics in obstetrics and the correct appointment of laboratory and instrumental studies, expresses his opinion on the topic of the lesson, demonstrates clinical thinking.
«4»	The student is well versed in the material, participates in the discussion and solution of a situational clinical problem, demonstrates knowledge of ultrasound screening diagnostics and the correct appointment of laboratory and instrumental studies with some errors, expresses his opinion on the topic of the lesson, demonstrates clinical thinking.
«3»	The student does not have enough knowledge of the material,

	uncertainly participates in the discussion and solution of a situational clinical problem, demonstrates knowledge of ultrasound screening diagnostics and the correct appointment of laboratory and instrumental studies with significant errors.
«2»	The student does not own the material, does not participate in the discussion and solution of a situational clinical problem, does not demonstrate knowledge of ultrasound screening diagnostics and the correct appointment of laboratory and instrumental studies.

List of recommended literature.

Main:

- Obstetrics and Gynecology: in 2 books. - Book 2. Gynecology: textbook (university III-IV r.a.) / ed. V.I. Gryshchenko, M.O. Shcherbyna - 3rd ed., vypr., 2020. – 376 s
- Clinical Obstetrics and Gynecology: 4th Edition/ Brian A. Magovan, Philip Owen, Andrew Thomson. – 2021. – 454 p.
- National approaches to the implementation of the system of regionalization of perinatal care in Ukraine (practical guidelines) // Digest of professional medical information. — 2012. — № 48—49. — pp. 1–59.
- Dias T, Arcangeli T, Bhide A, Napolitano R, Mahsud-Dornan S, Thilaganathan B. First-trimester ultrasound determination of chorionicity in twin pregnancy. *Ultrasound Obstet Gynecol* 2011; 38: 530– 532.
- Fisher J. First-trimester screening: dealing with the fall-out. *Prenat Diagn* 2011; 31: 46–49
- Bernard J-P, Cuckle HS, Stirnemann JJ, Salomon LJ, Ville Y. Screening for fetal spina bifida by ultrasound examination in the first trimester of pregnancy using fetal biparietal diameter. *Am J Obstet Gynecol* 2012; 207: 306.e1–5.

Additional:

- Gynecology: a guide for doctors./ V.K. Likhachev. – Vinnytsia: New Book, 2018.- 688 p.
- Situational tasks in gynecology: a textbook. / I.Z.Gladchuk, A.G.Volyanska, G.B.Shcherbyna and others.; ed. prof. I.Z.Gladchuk. – Vinnytsia: LLC "NilanLTD", 2018.-164 p.
- Diagnostics of obstetric and gynecological endocrine pathology: [textbook for interns and doctors-students of institutions (fac.) postgraduate

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