

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

Medical Faculty №2

Department of radiation diagnostics, therapy and radiation medicine and oncology

I APPROVE

Vice-rector for scientific and pedagogical work

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**METHODOLOGICAL DEVELOPMENT
TO PRACTICAL LESSONS
FROM EDUCATIONAL DISCIPLINE**

Faculty, MEDICAL course, 2nd year

Educational discipline RADIOLOGY

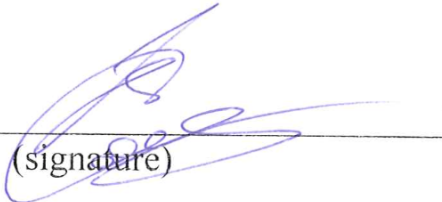
Odesa-2023

Approved:

Meeting of the Department of the Radiation Diagnostics, Therapy and Radiation
Medicine and Oncology
Odessa National Medical University

Protocol No. 1 dated 30.08. 2023

Head of the department _____


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PRACTICAL TRAINING

Content module 7.

Comprehensive radiation diagnosis of CNS diseases and emergency conditions.

Practical lesson No. 19.

Topic 19. Radiological research methods and radiological anatomy of the central nervous system. Radiation signs of diseases and injuries of the central nervous system

Goal: learn to distinguish the normal radiological anatomy of CNS structures; to choose a method of radiological examination for various pathological processes of brain structures; choose a method of radiological examination for various pathologies of the spinal cord; to compile an algorithm of research (including radiation) for various pathologies of the central nervous system; to analyze radiation symptoms of CNS diseases; evaluate the results of the used method of radiographic examination of the central nervous system

Basic concepts:

X-ray methods of studying the skull and brain (radiography skull, ventriculography, cisternography). Angiographic methods of CNS research. CT and MRI of the brain and spinal cord. Radionuclide studies of the central nervous system (static scintigraphy, SPECT, PET study). RFP used for radionuclide CNS research. Ultrasound of diseases in children. Radiological anatomy of the skull and brain. Radiological anatomy of the spine and spinal cord. The main radiographic signs of CNS pathology: traumatic damage to the skull, brain, spine and spinal cord; vascular diseases of the brain (stroke, intracerebral hematomas); infectious and inflammatory diseases of the head brain Radiation signs of brain tumors. Pituitary tumors.

Equipment: laptop with presentation, multimedia projector, radiographs, tomograms

Plan:

1. Organizational measures (greetings, verification of those present, announcement of the topic, purpose of the lesson, motivation of students of higher education to study the topic).

2. Control of the reference level of knowledge:

2.1 Requirements for theoretical readiness of students to perform practical classes:

- to know the normal radiological anatomy of the central nervous system;
- to choose a method of radiological examination for various pathologies of the central nervous system;
- to draw up an algorithm for radiation examination in various pathologies of the central nervous system;
- to analyze radiation symptoms of CNS diseases;
- to evaluate the results of the used method of radiation examination of the central nervous system.

2.2. Questions to check basic knowledge on the topic of the lesson:

1. What general and additional non-contrast techniques are used to study the skull? What information can be obtained when using them?
2. What groups of contrast methods are used in the study of the brain?

3. Diagnostic possibilities of angiography of brain vessels. Contraindications to its use.
4. What possibilities in the diagnosis of brain diseases open up when using computer tomography?
5. Diagnostic capabilities of MRI in the study of the central nervous system.
6. What general and additional radiological methods of research are used in the diagnosis of traumatic damage to the central nervous system.
7. X-ray diagnosis of brain abscess.
8. What radiation research methods are used in the diagnosis of brain tumors?
9. General radiation symptoms of brain tumors.
10. Name the radiation methods used to diagnose diseases of the spinal cord.
11. What diagnostic information about the condition of the spinal cord can be obtained using MRI?

3. Formation of professional abilities and skills (mastery of communication skills, dispensation, determination of treatment scheme, laboratory research, etc.) to be able to:

1. Draw up a plan for radiation research
2. To justify the need for any radiological method of researching the central nervous system
3. Distinguish traumatic injuries of the spine on radiographs
4. Instruct the patient on preparation for radiological examination of the central nervous system
5. Visualize fractures of the bones of the skull vault on craniograms
6. Distinguish between ischemic and hemorrhagic lesions of the brain on CT-grams.

Control materials for the final stage of the lesson (tasks, assignments, tests, etc.)

1. The victim of the car accident was taken to the neurosurgery clinic because there are signs of a craniocerebral injury.

Objectively: symptoms of focal brain damage, suspicion of a bruise.

What research method should be used in this case?

- 1) Angiography of cerebral vessels.
- 2) MRI.
- 3) CT.
- 4) X-ray of the bones of the skull.
- 5) Ultrasound of brain vessels.

2. Neurosonography was performed on a newborn child with clinical signs of birth trauma. The sonogram reveals an echo-negative band between the echogenic skin and the hyperechoic bone.

Specify the probable diagnosis.

- a) fracture of the bones of the skull vault;
- b) fracture of the bones of the base of the skull;
- c) cephalohematoma;
- d) intracranial hematoma;
- e) subdural hematoma.

3. A CT scan of the brain was performed on a patient with clinical symptoms of impaired cerebral circulation. At the same time, an area of increased density of an irregular shape with uneven contours was found in the left hemisphere.

Make a conclusion.

- a) brain ischemia;
- b) subdural hematoma;
- c) epidural hematoma;
- d) fresh intracerebral hematoma;
- e) brain cyst at the site of hemorrhage.

Practical lesson No. 20.

Topic 20. Radiation signs of emergency conditions.

Goal: to learn how to choose a certain radiological research method and to analyze the indications and contraindications for carrying out this or that radiological method of CNS research; explain the advantages and disadvantages of each of the radiation research methods and their characteristics; to learn how to analyze the X-ray image of the central nervous system in normal and pathological conditions

Basic concepts:

X-ray, radionuclide, ultrasound, magnetic resonance and tomographic signs of emergency conditions - myocardial infarction, pulmonary edema, hydropericardium, hydrothorax, pneumothorax, thromboembolism of the pulmonary artery, foreign bodies in the bronchi, digestive tract, intestinal obstruction, perforation of the abdominal cavity, traumatic injuries. The choice of the method of radiation research for diagnosis of a certain emergency condition.

Equipment: laptop with presentation, multimedia projector, radiographs, tomograms

Plan:

1. Organizational measures (greetings, verification of those present, announcement of the topic, purpose of the lesson, motivation of students of higher education to study the topic).

2. Control of the reference level of knowledge:

2.1 Requirements for theoretical readiness of students to perform practical classes:
Know:

1. radiation methods of research, which must be used at emergency situations;
2. indications and contraindications for radiation examination in emergency conditions;
3. possibilities and disadvantages of radiological methods of investigation of emergency conditions;
4. peculiarities of preparing patients for radiation examination;
5. contrast agents used in research, features use in emergency situations;
6. early and late radiation signs of the most common emergency conditions.

2.2. Questions to check basic knowledge on the topic of the lesson:

1. Radiation methods of research in emergency conditions.
2. Radiation methods of hydropericardium research.
3. Radiation methods of pulmonary edema research.
4. Radiation methods of myocardial infarction research
5. X-ray methods for the study of foreign bodies of the lungs and respiratory tract
6. Radiation methods of studying traumatic pneumothorax.
7. Radiological methods of hydrothorax, pneumohydrothorax research.
8. Radiation methods of pulmonary embolism research.
9. Radiation methods for the study of foreign bodies in the esophagus, stomach, intestines, perforation of a cavity organ, intestinal obstruction
10. X-ray methods of studying calculi in the biliary and urinary tracts
11. Radiological methods of research of disorders of cerebral blood circulation

When a foreign body is aspirated, it often gets into:

- a. left lower lobe bronchus
- b. left upper lobe bronchus
- c. right middle bronchus
- d. right lower lobe bronchus

Which of the listed X-ray methods is the most indicative for detecting a small amount of fluid in the pleural cavity:

- a. laterography (roentgenogram in the position of the patient on the affected side)
- b. computed tomography
- c. teleradiography

What is the nature of darkening determined on the X-ray of OGK in total exudative pleurisy:

- a. uniform dimming of high intensity
- b. non-uniform darkening of high intensity
- c. homogeneous darkening with separate areas of high intensity calcification
- d. heterogeneous darkening with areas of enlightenment

Perforation of a hollow organ on an X-ray examination of the abdominal cavity is characterized by:

- a. presence of free gas in the abdominal cavity
- b. violation of the position and function of the diaphragm
- c. flatulence

3. Formation of professional abilities and skills (mastery of communication skills, dispensation, determination of treatment scheme, laboratory research, etc.) to be able to:

1. Choose the optimal method of radiation examination for various emergency conditions.
2. To build a correct algorithm for sequential radiological research in emergency situations.
3. Distinguish the normal radiological anatomy of a body part from a pathological one.
4. Accurately evaluate and analyze the received diagnostic images.
5. To evaluate the results of the used method of radiographic research with different emergency situations.
6. To identify radiographic signs of emergency conditions.

1. Can the diagnosis of acute appendicitis be ruled out if no pathological changes are detected on the X-ray examination of the abdominal organs?

- A. Yes
- B. no

2. If areas of decreased density are not detected on the CT scan of the GM, can the possibility of an ischemic stroke be ruled out?

- A. Yes
- B. no

3. Which X-ray study is most sensitive to the manifestations of an ischemic stroke?

- A. KT GM
- B. MRI of GM
- C. X-ray of the skull in two projections
- D. Ultrasound of GM

4. If areas of increased density are not detected on the CT scan of the GM, can the possibility of a hemorrhagic stroke be ruled out?

- A. Yes
- B. no

Control materials for the final stage of the lesson (tasks, assignments, tests, etc.)

Task 1

A 29-year-old patient was transported by ambulance after receiving a stab wound while intoxicated. Unconscious. Blood pressure 120/80 mmHg, heart rate 60 bpm. Dyspnea.

To clarify the diagnosis, it is advisable to conduct:

Task 2

A 52-year-old patient was hospitalized in the surgical department due to complaints of unbearable pulling pain in the right upper quadrant of the abdominal cavity. Previous diagnosis of gallstone disease.

To clarify the diagnosis, it is advisable to use radiological research methods:

Task 3

An unconscious 64-year-old patient was taken by her relatives to the hospital's reception department due to blood pressure of 190/100 mm Hg and loss of speech. 2 hours have passed since the onset of signs of right-sided hemiparesis.

To clarify the diagnosis, it is most appropriate to start with:

Task 4

A 56-year-old patient turned to a pulmonologist with complaints of shortness of breath and sharp chest pain. It is known from the anamnesis that he has been suffering from thrombophlebitis for 10 years. Previous diagnosis of PE.

What X-ray examination is advisable to conduct the patient in the first place?

Task 5

Parents brought a 3-year-old child with suspicion of a foreign body (a small toy) that the boy could have swallowed. No clinical complaints.

Is it necessary to conduct an X-ray examination? If it is appropriate, which one?

4. Summary:

Current evaluation criteria in practical training

Rating	Evaluation criteria
Perfectly "5"	The applicant takes an active part in practical training; demonstrates deep knowledge, gives complete and detailed answers to questions; takes an active part in the discussion of the results of the radiological examination, correctly and consistently compiles the algorithm of the radiological examination in relation to a certain pathology; uses additional educational and methodological and scientific literature; expresses his own reasoning, gives appropriate examples, demonstrates clinical thinking. The test tasks are completed in full, all 100% of the answers to the questions are correct.
Fine "4"	The applicant participates in a practical session; knows the material well; demonstrates the necessary knowledge, but gives answers to questions with some errors; participates in the discussion of the results of radiation research, uses basic educational and methodological and scientific literature. The winner expresses his opinion on the subject of the lesson, demonstrates clinical thinking. The test tasks are completed in full, at least 70% of the answers to the questions are correct.

Satisfactorily "3"	The acquirer sometimes participates in a practical activity; partially speaks and asks questions; makes mistakes when answering questions; shows passive work in practical classes; the radiological research algorithm for a certain pathology is inconsistent with significant errors; shows fragmentary knowledge of the conceptual apparatus and literary sources. The acquirer does not express his opinion on the topic for any reason . The testing is done in full, at least 50% of the answers are correct.
Unsatisfactorily "2"	The acquirer does not participate in the practical session, is only an observer; never speaks or asks questions, disinterested in learning the material; does not take part in the discussion of the results of radiological examination, incorrectly compiles the algorithm of radiological examination for a certain pathology, gives incorrect answers to questions, shows unsatisfactory knowledge of the conceptual apparatus and literary sources. Testing is done, but less than 50% of the answers are correct.

5. List of recommended literature

Main:

1. Kovalsky O.V. Radiology. Radiation therapy. X-ray diagnostics: assistant. for students higher honey. education closing IV level of accreditation / O. V. Kovalskyi, D. S. Mechev, V. P. Danylevich. 2nd edition Vinnytsia: New Book, 2017. 512 p.
2. Radiology (radiodiagnosis and radiation therapy). Test tasks. Part 1. Kyiv: Book plus. 2015. 104 p.
3. Radiology (radiodiagnosis and radiation therapy). Test tasks. Part 2. Kyiv: Book plus. 2015. 168 p.
4. Radiology (radiodiagnosis and radiation therapy). Test tasks. Part 3. Kyiv: Book plus. 2015. 248 p.
5. Methods of radiation diagnostics: a study guide (Protocol of the Medical Center No. 5 dated 05.25.17) N.V. Tumanska, K.S. Barska. 143 p.

Additional:

6. Radiation medicine: Textbook for medical universities 3-4 academic year. approved by the Ministry of Education and Culture / edited by E. Pylypenka Kyiv, 2018. 232 p. kind. "Medicine".
7. Tomographic methods of radiodiagnostics: a study guide (Protocol of the Central Medical Center No. 5 dated 05.25.17) N.V. Tumanska, K.S. Barska, I.P.Jos, 91 p.
8. Diagnostic, treatment and preventive algorithms in internal medicine: teaching method. manual / under the editorship Prof. V. I. Denesyuk; Vinnytsia national honey. University named after M. I. Pirogov, Cafe. internal Medicine No. 3. Kyiv: DZK Center, 2015. 151 p. : fig., tab.
9. Clinical Radiology : The Essentials Fourth Edition by Daffner MDFACR, Dr. Richard H., Hartman MD, Dr. Ma 4th edition. 2014. 546 p.

Electronic information resources:

1. <https://radiographia.info/>
2. <http://nld.by/help.htm>
3. <http://learningradiology.com>
4. <http://www.radiologyeducation.com/>
5. <http://www.radiologyeducation.com/>
6. <https://www.sonosite.com>

