

**Federal State Budgetary Educational Institution of Higher Education**  
**«North-Ossetia State Medical Academy»**  
**of the Ministry of Healthcare of the Russian Federation**  
***Department of Internal Diseases No. 4.***  
***Head of the Department Doctor of Medical Sciences Professor***  
***ASTAKHOVA Z.T.***

***Guidelines for conducting a practical lesson with 6th year students of  
the Faculty of Medicine on the topic:***

**CLINICAL INTERPRETATION OF THESE ADDITIONAL  
STUDY METHODS IN GASTROENTEROLOGY  
(CLASS DURATION 4 HOURS)**

Guidelines for conducting a practical lesson with 6th year students of the Faculty of Medicine on the topic:

## CLINICAL INTERPRETATION OF THESE ADDITIONAL STUDY METHODS IN GASTROENTEROLOGY.

The purpose of the lesson: to study the methods of examination of gastroenterological patients and to substantiate the examination plan for a particular patient according to the recommended standards.

Motivation for the relevance of the topic:

The recommended examination schemes for the most important diseases of the digestive system include both laboratory and instrumental methods that have long been included in everyday clinical practice, and the most informative of modern diagnostic and often therapeutic methods.

Complaints of patients, their nature, the results of a physical examination usually make it possible to suspect one or another pathology from the organs of the digestive system, and often give reason to suspect other human diseases and to outline and conduct appropriate instrumental and laboratory studies to confirm or, on the contrary, exclude the alleged disease.

Methodically correct application of traditional methods of examination during the initial visit of the patient allows in some cases to correctly diagnose the nature and localization of the pathological process and avoid stressful for the patient and in some cases expensive and time-consuming instrumental studies. Nevertheless, the data of instrumental studies of the gastrointestinal tract are of decisive importance for diagnosis, choice of therapy tactics and monitoring of its results.

Informative research methods usually include ultrasound of the abdominal organs, endoscopy, biopsy, pathohistology, clinical and biochemical blood and urine tests, studies of the content of various metabolites in the blood and other media.

Determining the level of preparation of students:

The second and third levels of knowledge: methods of control - a written survey (20 min). Students should know the main issues of etiology, pathogenesis, clinic and diagnosis of gastroenterological diseases, recommended schemes and standards for examining patients, students should be able to independently identify the main syndromes in gastroenterology, make a preliminary diagnosis according to the accepted classification, determine the required amount of research and be able to interpret data from additional methods research - laboratory and instrumental, to justify the need for the appointment of this research method, taking into account indications and contraindications, possible complications.

Report of student curators in the ward: when reporting a patient, students should pay special attention to the following:

### ESOPHAGOGASTRODUDENOSCOPY

Diagnostic indications:

1. Dyspepsia, especially for persons over 40 years of age.
2. Bloody vomiting (hematemesis).
3. Loss of body weight.
4. Iron deficiency anemia.
5. Diarrhea (biopsy of the mucous membrane from the distal duodenum to diagnose celiac disease).

Therapeutic indications:

1. Dilatation of strictures of the esophagus and - in some cases - the pylorus.
2. Palliative treatment of esophageal cancer.
3. Sclerotherapy of bleeding varicose veins of the esophagus and cardia of the stomach.
4. Diathermo and laser photocoagulation for ulcerative and other bleeding lesions of the mucous membrane.

### STANDARD ACID REFLUX TEST

The patient is injected into the stomach with 300 ml of 0.1 M-hydrochloric acid and the pH of the esophagus is recorded using a pH probe located 5 cm above the lower esophageal sphincter after performing special techniques aimed at increasing intra-abdominal pressure: deep breathing, coughing, Valsalva test with straining. These techniques are performed in four positions - lying on the back, on the right and on the left side, lying with the head lowered by 20°. The test indicates GERD if a decrease in the pH of the esophagus is recorded in at least three positions.

### COLONOSCOPY

Colonoscopy consists in a total examination of the colon using flexible endoscopes with fiber optics. The method allows you to identify changes in the intestinal mucosa and, using a targeted biopsy, evaluate them using a cytological and histological research method.

Absolute contraindications to colonoscopy are severe forms of ulcerative colitis and Crohn's disease, the acute phase of ischemic colitis, chemical lesions of the colon in the acute phase, in which there is a risk of perforation, as well as severe heart and lung failure.

### ENDOSCOPIC RETROGRADE

### CHOLANGIOPANCREATOGRAPHY

This method, which is of great importance in the recognition of diseases of the organs of the pancreatobiliary zone, consists in filling the bile and pancreatic ducts with a contrast agent under visual control. It is possible to conduct a targeted biopsy in the organs under study, eliminate stenosis at the level of sphincters, remove stones from the ducts, etc.

Indications for ERCP are:

1. Suspicion of diseases of the pancreas, if the nature of the pathological process cannot be established by other studies.
2. Recurrent jaundice of unknown etiology and jaundice accompanied by high levels of bilirubin and alkaline phosphatase.
3. Pain in the upper abdomen, especially after surgery on the biliary tract, the cause of which cannot be established by other methods.
4. Suspicion of choledocholithiasis and stenosis of the bile and pancreatic ducts.

Contraindications for ERCP are:

1. All diseases and conditions that limit endoscopic examination of the upper digestive tract in general.
2. Patient intolerance to medications used in the study (especially for contrast agents containing iodine).
3. Acute pancreatitis and pancreatic pseudocysts (performing papillosphincterotomy is not contraindicated in this case).

#### BIOPSY OF THE LIVER

A liver biopsy makes it possible to make a morphological and, in some cases, an etiological diagnosis, to determine the activity of the inflammatory process in diffuse liver diseases.

Diagnosed diseases:

1. Primary and metastatic tumors.
2. Acute and chronic hepatitis and hepatosis.
3. Cirrhosis of the liver.

A biopsy is needed in most cases:

Toxic and drug damage to the liver

Fatty hepatosis

Chronic hepatitis

storage diseases

Disease control:

progression,

recovery

Differential diagnosis of fibrosis-cirrhosis

Tumors

Focal processes that require targeted biopsy under the control of echolocation, computed tomography, laparoscopy

Biopsy is usually unnecessary

Viral hepatitis

Advanced cirrhosis

Metastases

Differential diagnosis between obstructive and parenchymal jaundice, which is solved with the help of echography or ERCP.

Contraindications for liver biopsy:

1. Lack of consent of the patient.
2. Hemorrhagic syndrome.
3. Thrombocytopenia below 800,000/mm<sup>3</sup> (80 x 10<sup>9</sup>/l)
4. Severe ascites.
5. Dilated intrahepatic and extrahepatic bile ducts.
6. Right-sided pleurisy, right-sided lower lobe pneumonia, skin infection at the puncture site.
7. Cysts, liver echinococcosis, liver hemangioma.
8. Severe emphysema, tachypnea, orthopnea, heart failure.

When performing percutaneous puncture liver biopsy (PKBP), the following complications are possible:

1. Reaction to local anesthesia.
2. Pain at the biopsy site.
3. Bleeding.
4. Perforation of the hollow organ of the abdominal cavity.
5. Bile peritonitis, especially if the puncture is performed in the presence of dilated bile ducts.
6. Pneumothorax.

However, these complications in PPBP are extremely rare and can be avoided. It is possible to conduct this study under the control of echohepatography.

Laparoscopy

Laparoscopy is usually performed after other less invasive examination methods have been found to be uninformative.

Indications for laparoscopy:

1. Diagnosis of focal lesions of the liver.
2. Recognition of diffuse diseases: cirrhosis with determination of morphological type, identification of rare liver diseases - hemochromatosis, amyloidosis, syphilis, lymphogranulomatosis, sarcoidosis.
3. Discrepancy between clinical and biochemical parameters and blind liver biopsy data.
4. Differential diagnosis of jaundice.
5. Establishing the level of obstruction of the biliary tract and its causes in subhepatic jaundice.
6. Hepato- and splenomegaly of unclear origin.
7. Identification of tumor formations of the epigastrium.
8. Differential diagnosis of gallbladder cancer and chronic cholecystitis.
9. Ascites of unclear origin.

Contraindications to laparoscopy are hemorrhagic diathesis, severe cardiovascular and respiratory failure, acute coronary circulation disorders, hepatic precoma and coma, extensive adhesive process in the abdominal cavity, cachexia, large diaphragmatic hernia.

Complications of laparoscopy are rare but varied: pain after pneumoperitoneum, tachycardia, nausea, vomiting, subcutaneous and preperitoneal emphysema, lower lung atelectasis, pneumothorax and pneumomediastinum. Within a few days after laparoscopy, subfebrile temperature is possible. One of the most serious complications is bleeding into the abdominal cavity and perforation of the abdominal organs.

#### RADIATION METHODS OF DIAGNOSIS

X-ray studies play a very important role in the diagnosis of diseases of the digestive system.

The decision to conduct an x-ray examination is made by the attending physician together with the radiologist, and the choice of technique and the scope of the study is made by the radiologist. It is necessary to decide which organs and in what order to be examined, as well as to exclude contraindications.

With a complete examination, irrigoscopy, X-ray examination of the esophagus and stomach are prescribed. For better perception, the information obtained with the help of X-ray examination is grouped according to the following syndromes:

- ☐ organ dislocation syndrome;
- ☐ syndrome of pathological changes in the relief of the mucous membrane;
- ☐ alimentary canal enlargement syndrome, diffuse or limited;

#### ULTRASONIC RESEARCH.

The use of ultrasound for diagnostic purposes is based on the uneven reflection of ultrasonic waves from tissues or organs due to their different acoustic impedance. The technique of ultrasound research was called echography. To study the abdominal organs, three methods of recording reflected ultrasonic pulses are used: one-dimensional echography, two-dimensional echography and complex scanning.

#### CT SCAN

Indications: technical impossibility of ultrasound due to the accumulation of gas in the intestines, obesity, doubts about the correctness of the diagnosis. CT scanning is superior to ultrasound in visualizing pancreas and choledochal stones. To clarify the diagnosis using CT scanning, it is possible to conduct additional studies with the administration of contrast agents orally or parenterally.

The main achievements of computed tomography in the diagnosis of focal liver lesions are associated with the possibility of their detection against the background of unchanged parenchyma. Differential diagnosis is based on visual and densitometric criteria of foci of different origin. Cysts and abscesses differ most significantly from the unchanged parenchyma; much less - metastases of a malignant tumor, however, they are also less dense than the parenchyma. The method has proven itself in the detection of cysts. Identification of well-defined contours with homogeneity of the content and absolute densitometry figures approaching zero allows an unmistakable diagnosis.

#### MAGNETIC RESONANCE METHOD

Magnetic resonance imaging is considered potentially superior to all other methods for diagnosing focal processes in the liver and pancreas, but the indications for its use have not yet been finally established. This study is contraindicated in patients with implanted pacemakers and other magnetoactive materials (prostheses, paper clips, etc.).

#### DUODENAL SOUNDING

The study is carried out with a two-channel probe. The cystic reflex is induced by intraduodenal administration of 50 ml of 25% magnesia sulphate solution (30 ml of vegetable oil, 40 ml of 10-20% glucose solution or 3 mg of cholecystokinin intravenously). Two variants of duodenal sounding are used.

1. The classic Meltzer-Lyon method:

Reveals three phases of bile secretion - portions A, B, C. When 0.15 g of methylene blue is administered orally, the bile of portion B becomes blue-green. This reliably distinguishes it from the liver portion of C.

## 2. Five-fraction duodenal sounding:

Phase I (choledochus) - from the moment the probe is inserted to the introduction of a vesicular reflex stimulator. Normally, its duration is 10-20 minutes, the amount of bile is 6-16 ml;

Phase II (closed sphincter of Oddi) - the time from the introduction of the stimulus to the appearance of bile from the probe. The duration of the phase is 3-6 minutes;

Phase III (portion A) - from the opening of the sphincter of Oddi and the release of light golden bile until the appearance of dark brown bile (bladder contraction). Duration 3-4 min. The amount of bile is 3-5 ml;

Phase IV (cystic - portion B) - from the moment of excretion of gallbladder bile to the beginning of the separation of amber-yellow hepatic. Duration 20-30 min. Quantity - 20-50 ml;

Phase V (portion C) - 15-30 ml of hepatic bile is released within 10-15 minutes.

Fractional study of gastric juice. The method allows you to study gastric secretion for a long time, as well as to get an idea of its nature in the complex reflex phase and the neurohumoral phase. In this regard, there are two stages of fractional gastric sounding:

- ☐ definition of basal secretion;
- ☐ determination of sequential (stimulated) secretion.

The first stage - the definition of basal secretion - is as follows. In the morning on an empty stomach, a thin probe is inserted into the patient's stomach, all the contents of the stomach are removed, and then gastric juice is aspirated every 15 minutes for an hour. The total volume of these portions in ml is the volume of basal secretion of gastric juice.

The second stage - sequential stimulated secretion - is the determination of the secretory function of the stomach every 15 minutes after subcutaneous administration of histamine for an hour. As secretion stimulants in the classical study, a test breakfast according to Leporsky - 200 ml of cabbage juice, according to Petrov and Ryss - 200 ml of cabbage broth or 200 ml of meat broth, according to Kach and Kalk - 0.5 g of caffeine per 300 ml of water). Several dozen trial breakfasts have been proposed, but they all have a number of negative qualities: some are not physiological (caffeine, ethyl alcohol), others are unstable in composition (meat broth, cabbage broth and juice).

There are submaximal and maximum histamine tests. For submaximal stimulation, histamine is administered at a dose of 0.008 mg/kg of body weight, for maximum stimulation - 0.025 mg/kg of body weight. The maximum histamine test is rarely used due to severe side effects.

Determine the following indicators of gastric secretion:

- ☐ the volume of juice on an empty stomach;
- ☐ volume of juice within an hour before stimulation (basal secretion);
- ☐ volume of juice within an hour after stimulation with histamine or pentagastrin;
- ☐ total acidity, free hydrochloric acid and pepsin content;
- ☐ pH of gastric juice.

The production of hydrochloric acid is calculated for 1 hour (debit-hour).

## LABORATORY RESEARCH METHODS

### BIOCHEMICAL STUDIES

In the complex of biochemical studies, the following functional indicators are important: 1) the ability of the liver to transport organic anions, which is assessed by the level of bilirubin or the rate of release of exogenous dyes; 2) the metabolizing capacity of the liver based on the release of drugs, determination of the level of ammonia and phenols; 3) synthesis of various whey proteins.

#### Classification of liver function tests

##### 1. Biotransformation of organic anions

###### Indicators of pigment metabolism

###### Samples using dyes

a) bromsulfaleic

b) indocyanic

##### 2. Metabolizing (neutralizing) ability of the liver

###### Drug metabolism (antipyrine test)

###### Excretion of galactose

###### Determination of ammonia, phenols

##### 3. Indicators of the synthetic function of the liver

###### Albumins

###### Globulins

###### clotting factors

###### Lipoproteins

## ENZYME MARKERS OF HEPATOBILIARY DISEASES.

Markers of cytolysis and hepatocellular necrosis

Aminotransferases:

AlAT

ASAT

Aldolase

Glutamate dehydrogenase

Sorbitol dehydrogenase

Ornithine carbamyl transferase

LDH and its isoenzymes

Markers of violation of the synthetic function of the liver

Cholinesterase

Cholestasis markers

Alkaline phosphatase

5-Nucleotidase

Leucine aminopeptidase

$\gamma$ -Glutamyltranspeptidase

## DIAGNOSIS OF HELICOBACTER INFECTION

Cytological study. For cytological examination, smears-imprints of biopsy specimens of the gastric mucosa (antrum) are used during gastroscopy. The biopsy must be taken from areas with the greatest hyperemia and edema, but not from the bottom of erosions or ulcers. Then the smears are dried and stained according to the Romanovsky-Giemsa method. Helicobacteria are located in the mucus, have a spiral, curved shape, are S-shaped.

There are three degrees of contamination with *Helicobacter pylori*:

- ☐ weak (+) - up to 20 microbial bodies in the field of view;
- ☐ medium (++) – up to 50 microbial bodies in the field of view;
- ☐ high (+++) – more than 50 microbial bodies in the field of view.

Urease test. Helicobacteria secrete the enzyme urease, under the influence of which the urea contained in the stomach decomposes with the release of ammonium. The ammonium ion formed as a result of the reaction significantly increases the pH of the medium, which can be ascertained using an indicator, and, therefore, visually noted by a change in its color.

In the presence of Helicobacteria in the biopsy, the medium acquires a crimson color. The time of appearance of crimson color indirectly indicates the amount of *Helicobacter pylori*.

(+) - insignificant infection (crimson coloration by the end of the day);

(++) moderate infection (crimson staining for 2 h);

(+++) - significant infection (raspberry color appears within the first hour);

(-) - the result is negative (crimson staining occurs later than in a day).

C-urea breath test. The method is based on the fact that <sup>13</sup>C-labeled urea taken orally is decomposed under the influence of *Helicobacter pylori* urease to form ammonia and CO<sub>2</sub>. In exhaled CO<sub>2</sub>, the content of <sup>13</sup>C is determined and, according to its level, a conclusion is made about infection with Helicobacteria.

The study is carried out on an empty stomach. First, two background samples of exhaled air are taken into plastic test tubes with an interval of 1 minute. Then the patient takes inside a light test breakfast (milk, juice) and a test substrate (an aqueous solution of <sup>13</sup>C-labeled urea). Then, within 1 hour at intervals of 15 minutes, 4 samples of exhaled air are taken.

The content of <sup>13</sup>C in the exhaled air is determined using a mass spectrometer. Depending on the percentage of the <sup>13</sup>C isotope in the exhaled air, there are 4 degrees of infection with

*Helicobacter pylori*: less than 3.5% - mild;

3.5 - 6.4% - average;

6.5 - 9.4% - severe;

More than 9.5% is extremely severe.

Normally, the content of <sup>13</sup>C in the exhaled air does not exceed 1% of the total amount of CO<sub>2</sub>.

The method is extremely expensive and not yet widely available.

microbiological method. Crops for the determination of *Helicobacter pylori* are produced from biopsy specimens of the gastric mucosa. Incubation of crops is carried out under microaerophilic conditions with an oxygen content of not more than 5%. To create such an environment, special gas generating chemical packages are used. For the growth of Helicobacteria, special blood nutrient media are used. After 3-5 days, small, round, transparent, dew-colored colonies of Helicobacteria appear on the nutrient medium. Then the isolated culture is identified.

histological method. The material is biopsy specimens of the gastric mucosa in places of the most pronounced inflammation.

Thin sections are prepared and preparations are stained with hematoxylin and eosin or by the Romanovsky-Giemsa method. Helicobacteria are detected in the form of spiral, S-shaped bacteria.

#### LABORATORY STUDY OF FEAST

macroscopic study. During macroscopic examination, attention is paid to the quantity, texture, shape, color, smell, as well as the presence of food residues, pathological products (mucus, blood), foreign bodies and parasitic elements. The largest part of the fecal masses are products produced by the digestive tract or its glands. They make up  $\frac{1}{4}$  of the dry stool content of a normal person. Undigested or partially digested food residues in the form of fiber represent only  $\frac{1}{3}$  of the total amount of feces.

Microscopic examination. Muscle fibers, if they have been digested, take the form of oval fragments with rounded ends and do not have transverse striation. Due to the bile present in them, they are colored yellow or golden yellow.

The number of muscle fibers in the preparation to a certain extent depends on the amount of meat taken with food. The excess of muscle fibers in the preparation can be explained by three main reasons: gastric hyposecretion, insufficiency of pancreatic juice and accelerated transit of food masses through the gastrointestinal tract.

Neutral fat is found in small amounts in normal stool. It has the form of transparent drops of a yellowish color due to the presence of bile in them.

Fatty acids occur in the form of thin and long needles 8–30  $\mu\text{m}$  long, arranged in amorphous aggregates. The presence of elevated amounts of neutral fats indicates pancreatic insufficiency. An abundance of fatty acids indicates a lack of exocrine function of the liver or impaired absorption of fat in the small intestine. Absorption disorders are also indicated by soaps that appear abundantly in the stool due to accelerated intestinal transit.

Starch is easily detected, turning dark blue when undigested and purple or red when digested. Bound and amorphous starch, as it is digested in the digestive tract, loses its dark blue color, becoming lighter and then red. With a carbohydrate diet, starch is usually found in one form or another in the feces of a healthy person. A large amount of starch in a normal diet indicates insufficient digestion. The presence of starch in the faeces is usually attributed to either pancreatic insufficiency or, to a greater extent, accelerated intestinal transit.

Клетчатка выявляется в двух формах – перевариваемой и неперевариваемой. Перевариваемая клетчатка It is represented by a shell of plant cells of various shapes and sizes. The only type of fiber that undergoes partial degradation as a result of the action of the microbial flora of the colon is the fiber of starchy substances and carrots. In humans, there are no enzymes in the gastrointestinal tract that break down fiber.

Fiber that has undergone microbial fermentation processes in the colon should not be found in abundance in fecal matter. Its presence in the form of digestible fiber is explained by rapid transit through the colon lumen.

Elements of intestinal origin. Among them, mucus, epithelial cells, erythrocytes and leukocytes are the most common in feces. A significant amount of mucus is usually found in inflammatory diseases of the colon. Epithelial cells are found in the form of cylindrical cells, their presence indicates abundant desquamation of the epithelium during inflammatory processes in the intestine.

The presence of erythrocytes indicates gastrointestinal bleeding during accelerated transit. The presence of a small number of leukocytes in the fecal masses has no diagnostic value. A large number of them indicates an inflammatory or ulcerative process of the distal parts of the digestive tract.

Chemical research. Among the analyzes carried out for these purposes, the following are most often used:

1. fecal pH;
2. reaction to occult blood;
3. determination of bile pigments, fat, ammonia, organic acids, soluble mucus and exudative proteins.

Clinical diagnosis: according to the accepted classification, taking into account additional laboratory and instrumental diagnostic methods.

Conducting classes in a thematic classroom. Analysis of the features of the etiology, pathogenesis, clinic and treatment of a particular patient. Indicate the main methods of examination of the patient, justify the need for their appointments, the main indications and contraindications for use.

The final part of the lesson: control of acquired knowledge - test control.

Summary.